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GENERAL NEWS SECTION.....

THE Massachusetts railway commission, for forty years the classic example of the mild commission, empowered only to recommend, and depending for its usefulness on the logic and reasonableness of its opinions, has at last become a "strong" commission, the legislature having empowered it to order changes in rates and improvements in service, the orders to remain in force until set aside by a court. Coincident with the passage of this law the governor has appointed a new and unknown man, a politician, to the chairmanship of the commission. But, though the legislature is thus radical, the public sentiment of the state, not always reflected with accuracy by the legislature, retains a good deal of conservatism, and it remains to be seen what use will be made of the new powers. Mandatory powers have been granted to the commission occasionally for several years past, in relation to certain details of railway operation, but they have been exercised with conservatism. The legislature has now taken radical action also in passing a law providing for the payment of compensation to employees injured while at their work, and, taking advantage of a constitutional provision designed for such cases, it asked the opinion of the Supreme Court of the state before passing the law, and received a reply approving it as constitutional. It does not go into effect until July 1, 1912. This court approval, with the fact that a high grade administrative board is provided for, will make the Massachusetts experiment peculiarly interesting.

THE Massachusetts legislature also showed its radicalism by authorizing the construction of a railway from Salem to Boston, 17 miles, where there are already three or four lines, after the railway commission, an expert board, established by law to deal with such questions, had decided that the proposed new road was not necessary. Again, the legislature showed unwarranted disrespect for the commission in passing a law requiring conductors and enginemen to have had a certain amount of experience. As originally drawn, this law had no qualifying clause, and in case of a strike would have tied the hands of the railways completely, but as finally passed, each section—one referring to enginemen, and one to conductors—allows the employment of anyone who shall have been employed as a locomotive engineer (or conductor) prior to the passage of the act. Thus, if a strike were to occur today the employer could engage "strike breakers" who had had experience on other roads, even if that experience had been very brief and very far in the past. Ten years hence, however, this provision will not be of much value. Section 4 of the law excepts hostlers moving engines "in or around engine houses." Sooner or later the meaning of this phrase "in or around" will probably have to be defined by the courts, as a hostler moving an engine on the main track may be "around" an engine house; and some notable accidents have been caused by entrusting main line movements of this kind to hostlers not fully competent for the duty. Section 4 also provides for running a train to a terminal when the conductor or engineman is unexpectedly disabled. Governor Dix of New York had the sense and courage to veto a number of bills in which the legislature attempted to perform the functions of the Public Service Commission.

THE New York State Public Service Commission, Second district, two years ago did a notable public service in its adverse decision on the application of the men who proposed and promised to build an unnecessary railway from Buffalo to Troy—a 300 mile line to parallel a six-track railway and the Erie canal; and now that commission, slightly changed in its membership, has repeated its refusal. The present decision, reported in another column, is unanswerable. Chairman Stevens is a master at investigation and analysis, and he completely demolishes the claims of these promoters. Moreover, some of his strongest points elicit no word of reply from them, and their case is shown to have the characteristics of a "strike"—a scheme

to get rights of way merely to sell out. Their financial backing shows up so poorly that the commission treats the statements concerning it as absurd—strong language, surely.

It is a great pity that five public service commissioners, burdened with important duties in the promotion of the welfare of the people of the state, should have thus to spend many weary days in exposing pretensions which never deserved a hearing. The state of New York now has adequate administrative and judicial machinery to require reasonable service and fair rates from its existing railways, and the old policy of accomplishing this end by encouraging the construction of parallel lines, almost always a wasteful expedient, is out of date. Moreover, the New York Central has been increasing its facilities vigorously for years, and evidently with the rational purpose of making an efficient railway, regardless of competition. Such being the situation, and it is similar in other states, it would without doubt be to the interest of the public if we could have in all the states commissioners with the knowledge, statesmanship and courage to deal out something like "Dutch justice" to the shadowy schemes of unknown promoters. A three days' hearing ought to have settled a case like that of the B. R. & E.; one day would suffice if promoters did not so easily get the aid of people who ought to know better. Many citizens fail to appreciate their responsibilities in regard to such public institutions as railways. Except for the petition of unreflecting but respectable citizens of the interior cities and the amiable assistance of the newspapers in printing whole columns about the scheme, these promoters would not have attained the respectable standing that got them the attention of the commission. Laws establishing commissions usually aim to obviate the tedium and expense of court procedure by authorizing summary action without unnecessary formalities. This provision ought to be more generally availed of.

THE TRAFFIC MAN AND THE LAWYER.

THE most striking element in Commissioner Lane's supplemental report in the Reno and Phoenix cases is the constant suggestion of the pains and thought exerted by the trans-continental railways, for over 30 years, to neutralize and minimize the effect of water competition, whether via Magellan's Straits, Panama or Tehuantepec. The best brains of railway managers were put into the task, and in the main they accomplished wonders, at least from the point of view of putting up the most effective fight against water competition and at the same time retaining to themselves the maximum possible receipts from all other business.

This was an obvious problem. The enemy was in the field, and his equipment and mobility were known. But Commissioner Lane's recital suggests the inquiry whether railway managers are today meeting a more complicated attack on their earnings with pains and skill equal to the abilities they showed in their earlier work.

We refer to the results flowing from orders of the Interstate Commerce Commission. Two cents per hundred reduction on a single commodity, or even on a class rate, does not look very big when considered in its relation to the carrier's other business. Moreover, the commissioner's power to reduce rates may have brought some traffic men to a feeling of impotence or indifference. But it should be borne in mind that every reduction is probably but a step in a process. The tendency is toward the eventual reduction of *all* rates, and assuredly the prevention of such a result as that is well worth the best traffic man's best powers.

On many railways, a litigated rate is treated like other litigated matters, and is passed over to the law department. Though he try his best, the average lawyer will never become a fully informed traffic man. His dealings with rate cases are on too theoretical a plane, and, moreover, he too often has much work in fields other than rates.

But the result of the downward tendency of commission-made rates is precisely the same as the result of real water competition, or of any effective competition. Rates are lowered and revenues, especially net revenues, shrink. Thus the Interstate Commerce Commission, is constantly doing to railway earnings the very thing that forceful competition does. Wherefore, the traffic man's most important ally today is his rate lawyer. The traffic man should guide the lawyer's defense and attack precisely as he conducted his naval battles. The law department must become the traffic department as to all rate matters, and no traffic man should ever be heard to excuse himself by saying that such-and-such a rate matter was handled by the law department.

There is so much to be said on the railway's side that a vigorous defense will sometimes win and oftener will accomplish a lesser rate of reduction. The contest is governed by parliamentary rules, and the weapons of defense are delicate and fragile, but a concerted stand of the best wits among the traffic men will save millions of gross receipts.

DISCIPLINE OF ENGINEMEN.

THE record of prominent train accidents in July, printed in this issue, includes the derailment at Bridgeport on the New York, New Haven & Hartford, which caused widespread discussion. The lessons of this accident are the same as those noted last week in connection with the Batavia collision, except that in this case the engineman and fireman both were killed and evidence concerning their physical and mental condition is conjectural or lacking. As we said of Batavia, the problems are difficult; but there is no warrant for saying that they are impossible of solution, for there has been no thorough, persistent and intelligent attempt at their solution. This is the fact, so far as the public knows. If individual superintendents here and there have trained their runners to better vigilance nothing has been said about the methods used and those methods have not been much imitated. Some roads are better than others, to be sure; but the thing that disheartens the public is that the New Haven road's practice is, or ought to be, among the best.

The opinion of the coroner that the thing to do to prevent such a disaster is to make crossovers long enough to be traversed at high speed deserves a word, for it has been endorsed in respectable quarters. The trouble with this remedy is that it attacks the problem at the wrong end. The shortness of the crossover can hardly be called even a secondary cause. The primary cause, the failure of the engineman to heed the distant signal, is the true point of attack. Lengthening the crossover would logically need to be followed by the straightening of all curves. That No. 8 crossover at Bridgeport could have been converted to a No. 20 at an expense of a few hundred dollars; but only a mile farther east the train would have hit a curve where all trains have to limit their speed to about 30 miles an hour. To make the road safe for unlimited speed through Bridgeport would cost several millions. Moreover, the limit of speed at the longest practicable crossovers is 40 miles an hour, or 50 at the outside; but the regular speed of many trains is 60, and some run at 65 and 70. A set of No. 20 crossovers on a four-track road requires a straight stretch a quarter-mile long, and often the crossovers are needed at a place where such a tangent is not available. And what will the crossover doctors do with the six or eight other places between Harlem River and New Haven where speed must be reduced? And on what principle are they basing their opinions when they propose to make a railway safe for trains that are run by enginemen who pass stop signals without heeding them?

As to the engineman, for all practical purposes it may be assumed that he was asleep. He was acquainted with the road, the switches and signals, and, though an extra runner, was familiar with the train. Sometimes a runner goes through a crossover too fast simply by an error of judgment, due to an excess of zeal in making time; but that could hardly be the case

where the speed, as in this case, was *four times* that allowed by rule. Being asleep or otherwise incapacitated, what could the superintendent have done about it? An extreme course would be to provide a regular daily medical examination of men going on duty, and an inquisition to see if they were rested. No one has proposed seriously to go that far, and it seems quite certain that no such provision would surely detect deceivers. It would irritate many men and the superintendent would have a troublesome task in allaying that irritation. If it were a part of the routine it would be a reminder to men who, though well disposed, were careless; but it is very doubtful whether the money thus used could not be spent to better advantage in other ways.

Men are often tempted to work when not in good mental or physical health because of the compelling motive of earning as much money as possible. Could they be prevented from yielding to such temptation by paying them by the month, and giving liberal allowances of time off? Possibly, to some extent; but there can be little doubt that cheating would be greatly promoted. To maintain a business-like arrangement would be next to impossible.

No; it does not seem likely that either of these methods would invariably keep sick or weary men from going into engine cabs. A more hopeful idea would be to try to induce them to stay off voluntarily. A man with good judgment, a good conscience and a large bump of caution would do so without any action on the part of his superior; and these qualities can be cultivated. Conscience is supposed to be cultivated in the school or the church, not the railway office; but, both in school and church, the disposition to do right is inculcated partly by showing the certainty that to do wrong will bring a severe penalty; and *that* is an instrumentality which the railway can use. Sometimes the best available means of preventing stealing by conductors is to exercise rigorous compulsion in the correction of lesser faults; likewise, enginemen can be influenced powerfully to avoid going to sleep in the cab by maintaining such strict discipline that they will see that there is trouble in store for them when they are awake, except as they maintain the highest vigilance every moment.

We do not sufficiently heed the lesson of the derailer. A derailling switch is a powerful "moral safeguard," because enginemen know that disregard of its warning is sure to be found out. A derailling switch at the approach to every crossover, every block signal and every danger point would tend powerfully to make enginemen vigilant, and such a mechanical calling-to-account, if interposed along a railway frequently enough, would cure the fault that we are talking about. But it would be irrational to adopt such radical measures without first exhausting simpler remedies. A derailling switch is of doubtful value, or is an added danger, at many places on four-track lines, and at best it is a costly complication on any line. An automatic train-stop is also a "moral safeguard," but it is subject to many disadvantages on the ordinary railway and cannot be justified except as a last resort in a desperate case. But the *lesson* of these devices is that enginemen can be kept vigilant by convincing them that neglect cannot be concealed. On most roads this can be done far better than it now is, and this without either details or automatic stops. The best discipline is very rare. If it were well known that the requirements were severe, and that they were never relaxed, a half sick man or one needing sleep would *think in season*, and not try to take out his run.

A superintendent who has any suspicion that a Bridgeport case may occur on his division ought to prepare to answer the following questions from his general manager's office:

How many of your enginemen have run past stop signals within the past six months?
 How many of these men were discharged?
 How many of the discharged appealed? How did the appeal result?
 In how many cases were unreasonable claims made in appeals? Do you ever reinstate a discharged engineman because you lack the grit to convince the general superintendent that you are right?
 Have you enough inspectors so that you feel confident that serious misconduct does not escape your attention?

Do you have inspections made with the frequency and skill necessary to lead enginemen (and other employees) to report infractions of rules voluntarily?
 If you have not enough inspectors, secret or non-secret, why do you not have more? Who is at fault for the lack?
 Do you get good results from winking at such offenses as disregard of signals?
 Are you cold and judicial enough to apply severe discipline to good runners? To those who try to wheedle you? To those who are most powerful in their lodge?
 What proportion of discharged or suspended enginemen do you convince of the justice of your action?

Discipline of the kind suggested by these questions, administered without fear or favor, would cause a marked awakening on many roads; and an awakening would improve the service; for there can be no doubt that a great majority of the mistakes of enginemen are the result of habitual loose thinking, which will never be corrected by circulars or diminished by horizontal increases of pay, or by being pleasant to grievance committees.

The Bridgeport case, like Batavia, N. Y., Grindstone, Me., and many others, brings up the question of the fireman and his value as a monitor. If an engineman drops dead or falls in a faint, the fireman's presence as a lookout is of vital importance. The Bridgeport fireman was experienced; but that does not amount to much if the requirement that firemen shall see signals is not enforced. This rule is in all the rule books in the country, but on nearly or quite all of the roads it is enforced poorly or not at all. On the New Haven the rule says frankly that the fireman is to observe signals *when not otherwise engaged*. On other roads this is an unwritten proviso. But with that proviso what is the rule good for? Superintendents who have made this rule a real safeguard should stand up and be counted. The rule should be enforced or else abolished. Except perhaps on the heaviest freights its complete observance is possible. Is it not worth while to make its observance actual? If firemen neglect it and enginemen acquiesce in the neglect, the result is that at many of the most critical times there is on the engine only one lookout man. This being admitted, as the facts compel us to admit, the way is open for Congress to require a third man on the engine, or to order the general introduction of automatic stops; for the presence of the existing rule in the rule book is presumptive evidence that a single lookout is not regarded by the railways as sufficient.

The most hopeful means immediately available for preventing these unexplainable derailments and collisions is to secure, at any expense, from every engineman, the best service of which he is capable. The great majority of enginemen have ample mental and moral capacity for their duties under rigid discipline. The inefficient must be weeded out.

NEW BOOKS.

Investigations on the Briquetting of Lignite. By Charles L. Wright. Issued by the Bureau of Mines, Washington, D. C., as Bulletin No. 14. The tests, conducted by the author, indicate that some American lignites equal German lignites in fuel value, and can probably be made into briquets on a commercial scale without the use of binding materials. Cohesion and weathering tests demonstrated that good briquets endure handling and resist weathering much better than the lignite from which they are made. Of four samples of raw lignite, three contained about 40 per cent. moisture and had a full value of 6,079 to 6,241 B. T. U., while a Texas lignite, with a moisture content of 33 per cent. had a fuel value of 6,840 B. T. U. The percentage of moisture removed in the process of briquetting ranged from 24 to 32 per cent., and the heat value of the briquet was 36.5 to 54 per cent. higher than that of the raw lignites. In the case of one of the North Dakota lignites the removal of 32 per cent. of moisture during briquetting permits a decided lessening of the cost of supplying a consumer with a given number of heat units. The advantage of the briquets in this respect is of especial importance when transportation to a distant market is involved. If the briquets possess no other advantage over raw lignite than their higher heat value, they would be worth 50 per cent. more than raw fuel. This bulletin can be obtained from the Bureau of Mines, Washington, D.C.

Letters to the Editor.

WIDE FIREBOXES.

PHILADELPHIA, Pa., July 28, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I read my friend Bell's letter on the history of wide fireboxes for locomotives in the issue of July 21, page 110, with much pleasure. In his letter I do not agree with one thing, and that is the date given for the first *wide firebox*, i. e., one extending over the driving wheels. I wish to call his attention to locomotives used in France as shown in Colburn's History of the Locomotive Engine, published in 1871. A wide firebox engine is shown on pages 89 and 90—Figs. 105, 106, 107 and 108—which was used in 1863.

HENRY F. COLVIN.

ENGINE NUMBERS READABLE AT NIGHT.

SACRAMENTO, Cal., August 1, 1911.

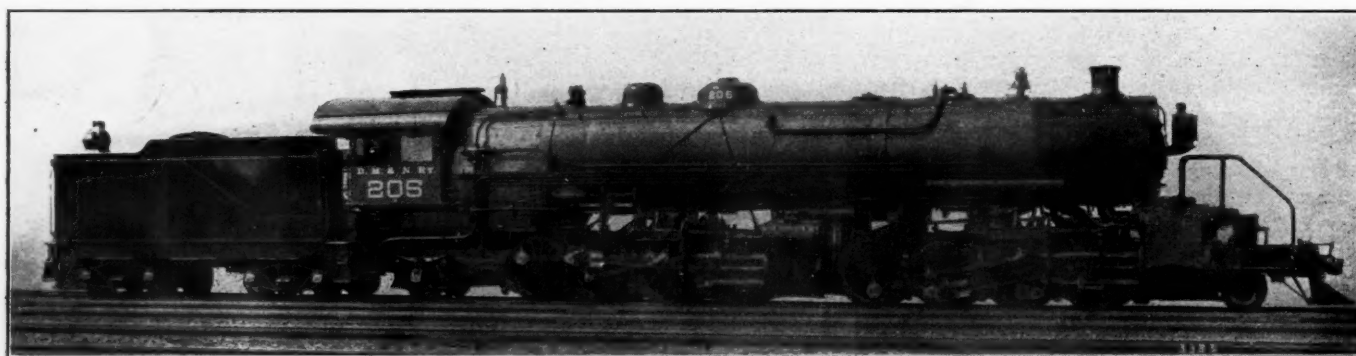
TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Standard rules provide for the insertion of engine numbers in train orders for the purpose of identification. Many passenger engines are equipped with electric generators to furnish current for headlights and engine indicators, and electric lights are provided for the benefit of the engineman in oiling instead of using a torch. Why not place two 16 c. p. electric lights under the iron step that is attached to the side of the tender above the running board, on Vanderbilt tanks, directly over the engine

to scrutinize the front of the engine, in the expectation of finding the number on the tender, and then the tender should fail him, he might be worse off than before. In this connection it is to be borne in mind that to require conductors, enginemen and others on moving trains to read engine numbers at night, at the risk of causing a collision if a mistake is made, cannot be dignified by any better name than a necessary evil. Use the block system, and render such a clumsy expedient unnecessary.—EDITOR.]

MALLET LOCOMOTIVES; DULUTH, MISSABE & NORTHERN.

The Duluth, Missabe & Northern has recently placed in service eight Mallet locomotives having the 2-8-2 wheel arrangement. These engines were built by the Baldwin Locomotive Works, Philadelphia, Pa., and are operating under specially difficult conditions. Their duty is to either pull or push trains of empty steel ore cars from the docks at Duluth, Minn., to the yard at Proctor, a distance of seven miles. For six miles there is an ascending grade of 2.2 per cent., combined with numerous compensated curves of 6 to 10 deg. The engines were built under guarantee to handle, on this grade, a train of 55 empty steel ore cars, each weighing 32,300 lbs., with a caboose weighing 20,000 lbs., at a speed of 12 m. p. h. This represents a load, exclusive of engine and tender, of approximately 900 tons. The locomotives have proved their ability to handle 950 tons under the specified conditions. The calculated tractive effort, working compound, is 91,000 lbs. The engines



Heavy Mallet Locomotive; Duluth, Missabe & Northern.

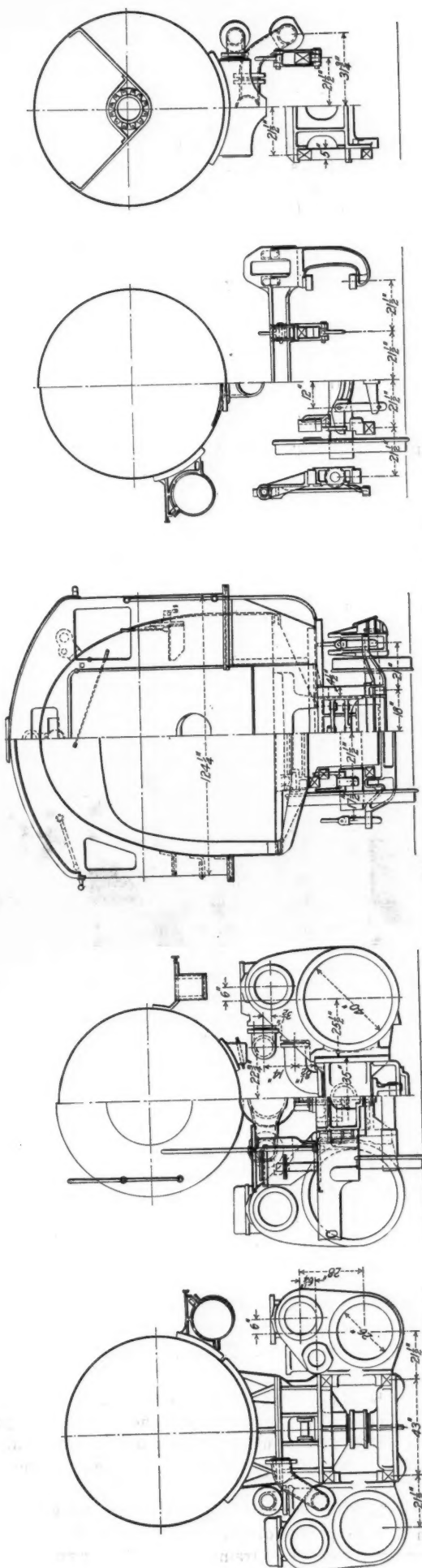
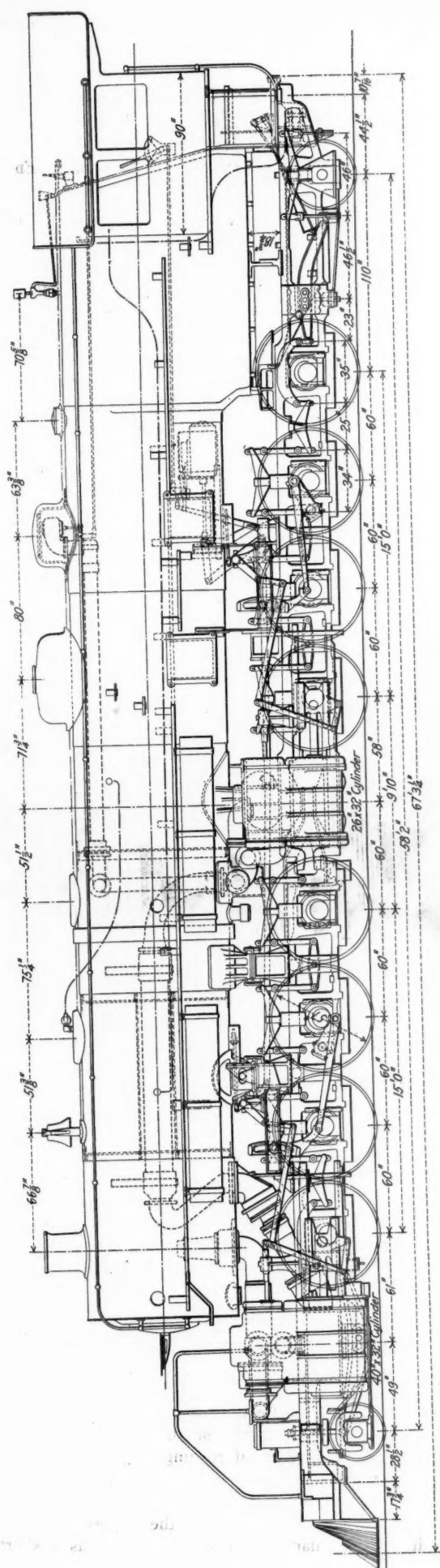
number that is painted on the side of the tender? This is the only one of the numbers that it is possible to see from moving trains at night. Incidentally, it may not be out of place to mention that many of the disastrous collisions occur at night. Trains always have to decrease speed materially at night to check engine numbers on the side of the tender by the insufficient light of a torch or lantern, and then there is sometimes a doubt if the reading is correct. By placing the electric lights on the side of the tender the rays of light will be thrown directly on the number and the doubt removed. By placing them under the iron step they would be protected from interference by anyone climbing to top of tender from running board. All doubt as to engine numbers would be removed and the numbers would be as plainly discernable as the train numbers in engine indicators. This idea, approved by many engine and trainmen, would be particularly applicable to single track roads using engines that are equipped with electric headlights.

WILLIAM SCHWAB.

[Engine numbers should be easily readable, day or night, by every person whose duty it is to read them. On this point everybody can agree with our correspondent. But it is highly desirable to have the numbers uniform in size, location and visibility, and unless *all* of the engines on a division were susceptible of the improvement suggested, the catching of numbers within a brief period of time might be made more confusing instead of easier. If a trainman or station man neglected

are capable of traversing curves of 18 deg., and are arranged for operating in either direction. They have a pilot and headlight at each end, and the arrangement of the truck wheels is said to be of special value in work of this character.

The boiler has a straight top, and is of the separable type, with a feed water heater in the front section. The water enters the heater through right and left hand check valves, and is discharged through an outlet placed in the manhole cover on the top center line. The main check valves are placed right and left, near the front end of the boiler proper, and approximately on the water line. The feed, after passing through the check enters, an internal horizontal pipe, 20 in. in length. This pipe is closed at the end and has holes drilled on its upper side so that the water enters the boiler in a number of small streams. This device is the invention of C. W. Seddon, superintendent motive power, Duluth, Missabe & Northern, and has given good satisfaction. The firebox has an exceptional amount of heating surface and volume, and approximates the Wooten type in shape. The grate is arranged to rock in four sections, and is provided with transverse drop plates, located between the front and rear group of rocking bars. The ash-pan has a single hopper, with dampers front and back, and draft openings under the mud ring at the sides. It is piped so that the ashes can be blown off the slopes into the hopper, and thence out through the back damper. The smoke-box has a short exten-



Mallet Articulated Locomotive; Duluth, Missabe & Northern.

sion and contains a high single nozzle, in front of which it placed the adjustable diaphragm. The stack is twenty inches in diameter, and it has an adjustable petticoat pipe beneath it.

As far as details of construction are concerned the boiler follows the regular practice of the builder for locomotives of this type and capacity. The separable joint surrounds an intermediate combustion chamber, located between the water heater and the evaporating section. The longitudinal seams are butt-jointed and welded at the ends. The dome is formed of a single piece of pressed steel, flanged to fit the radius of the boiler shell. The arrangement of the steam and exhaust piping used presents several interesting features. The throttle valve is connected to an internal dry pipe, and this, in turn, communicates with right and left hand steam pipes located in the combustion chamber. These pipes are seated on a saddle shaped casting, which is bolted to the underside of the boiler shell, and has cored in it suitable passages for the high pressure steam and exhaust. Short pipes connect these passages with the high pressure steam chests. Here the distribution is controlled by inside admission piston valves, 15 in. in diameter. The high pressure exhaust, after passing through the saddle, enters a cast iron elbow pipe and is conveyed to the reheater. This device is located in a 21-in. flue which traverses the center of the water-heater. It consists of two cast steel headers connected by 31 2-in. tubes and provides a reheating surface of 160 sq. ft. At the front end the reheater connects with a second elbow pipe. This pipe is located in the smoke-box and communicates with the flexible receiver pipe, which is arranged in accordance with the usual practice of the builders. The exhaust pipe connecting the low pressure steam chest with the smoke-box calls for no special comment. The low pressure distribution is controlled by outside admission piston valves, of the same dimensions as those used with the high pressure cylinders.

The valve motions are of the Walschaert type, and are controlled by the Baldwin power reverse mechanism. The links for both the front and rear engines are supported by longitudinal bearers, outside the leading driving wheels. Both the high and low pressure valves are given $\frac{1}{4}$ -in. lead. The cylinder by-pass valves have flat plates over the relief ports, this being the type ordinarily used by the builders on piston valve engines. The low pressure cylinders are lubricated by force feed oil pumps driven from the front valve motion. The frames are of cast steel and measure 5 in. in width. The articulated connection and the frame construction at the low pressure cylinders are in accordance with the usual practice of the builders. The forward equalization system is broken between the second and third pairs of drivers, while the rear system is continuous on each side of the locomotive. The front truck is center bearing, and the back end of the forward equalizer rests on a transverse leaf spring, which is suspended from yokes placed over the leading driving boxes. The front frames are strongly braced transversely by the two cast steel waist bearers on which the engine is supported. The rear frame braces include a substantial steel casting, which serves as a support for the front end of the mud ring. The latter is carried at the rear on a vertical expansion plate bolted to the foot plate. The tender frame is composed of 13-in. channels with front and back bumpers of cast steel. The trucks are of the arch-bar type with steel bolsters. The tank has a water-bottom and carries 9,000 gal. of water and 16 tons of coal.

The service in which these engines are employed requires the development of full power throughout the entire run and under such conditions heavy compound locomotives operate to the best advantage and show maximum economies. The new engines steam freely and preliminary tests indicate that they will prove fully capable of performing the duty required of them. The principal dimensions and ratios of these locomotives are given in the accompanying table.

Type	2-8-2
Service	Freight
Fuel	Soft coal
Tractive effort	91,000 lbs.
Weight in working order	448,000 lbs.
Weight on drivers	406,600 lbs.
Weight of engine and tender in working order	620,000 lbs.
Wheel base, driving	30 ft. 10 in.
Wheel base, total	58 ft. 2 in.
Wheel base, engine and tender	87 ft. 6 in.

Ratios.

Total weight ÷ tractive effort	4.92
Weight on drivers ÷ tractive effort	4.47
Tractive effort X diameter drivers ÷ heating surface	755
Total heating surface ÷ grate area	82
Firebox heating surface ÷ total heat. surface, per cent.	3.71
Weight on drivers ÷ total heating surface	59.2
Total weight ÷ total heating surface	65.1
Volume equivalent simple cylinders, cu. ft.	27.75
Total heating surface ÷ vol. cylinders	248
Grate area ÷ vol. cylinders	3.03

Cylinders.

Kind	Compound
Diameter	26 in. & 40 in.
Stroke	32 in.

Valves.

Kind	Bal. Piston
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Wheels.

Driving, diameter over tire	57 in.
Driving, thickness of tire	$3\frac{1}{2}$ in.
Driving, journals, main	11 in. x 12 in.
Driving, journals, others	$10\frac{1}{2}$ in. x 12 in.
Engine truck, diameter	$30\frac{1}{2}$ in.
Engine truck journals	6 in. x 11 in.
Trailing truck, diameter	36 in.
Trailing truck journals	6 in. x 10 in.

Boiler.

Style	Straight
Working pressure	200 lbs.
Outside diameter of first ring	84 in.
Firebox, width and length	96 in. x $126\frac{1}{8}$ in.
Firebox plates, thickness	$\frac{3}{8}$ in.
Firebox, water space	6 in. & 5 in.
Tubes—number and diameter	401— $2\frac{1}{4}$ in.
Tubes, length	21 ft.
Heating surface, tubes	4,934 sq. ft.
Heating surface, firebox	255 sq. ft.
Heating surface, feed-water heater	1,694 sq. ft.
Heating surface, total	6,883 sq. ft.
Grate area	84 sq. ft.

Tender.

Wheels, diameter	33 in.
Journals	6 in. x 11 in.
Water capacity	9,000 gal.
Coal capacity	16 tons

GOVERNMENT REGULATIONS FOR THE TRANSPORTATION OF DANGEROUS ARTICLES.

Beginning on the first of October next, the regulations prescribed by the American Railway Association for the transportation of dangerous articles, other than explosives, will be superseded by a code which has been issued by the Interstate Commerce Commission, and the new regulations, prefaced by a brief code of rules prepared by the American Railway Association and serving as an introduction and index to the government rules, is being sent out by the general secretary of the association. All railways are urged to re-issue their regulations in accordance with the new code as soon as possible, so as to give employees ample opportunity to study them before October 1. The Interstate Commerce Commission rules were drawn up originally by the railways' bureau of explosives. The rules have the force of law, and they require railways to furnish copies of them to shippers of dangerous articles on application.

An important and new feature of the government regulations is the inclusion of detailed specifications for shipping containers for dangerous articles. These fill eight pages of the pamphlet. There are six sets of specifications, covering the manufacture and test of glass carboys for corrosive and inflammable liquids; metal cans and boxes for inflammable liquids; seamless steel cylinders for gases under high pressure; lap welded steel cylinders for anhydrous ammonia; iron or steel barrels or drums for inflammable liquids, and wooden, wire-bound or fibre board boxes for matches. The adoption of these specifications, to be followed later by specifications for other containers, emphasizes the fact that the regulating authority exercised by the Interstate Commerce Commission to secure safe transportation, applies to

the shippers as well as to the carriers. The standards fixed by these specifications are higher than those heretofore in general use, increasing the cost of packing.

An important change in the body of the regulations is the use of a single list of well-known dangerous articles to replace the three lists of "Inflammable Articles," "Doubtful Articles," and "Excepted Articles," in the A. R. A. regulations. This simplification has been made possible by the education of shippers and railway employees, accomplished by the bureau of explosives during the past three years. Under the old regulations station agents were required to act somewhat in the capacity of a policeman in enforcing the rules. In doubtful cases they had to inform themselves in regard to the knowledge possessed by the shipper, not only of the requirements of the regulations, but of the characteristics of the material offered by him for shipment. These requirements are now the law of the land, applicable to the shipper as well as to the carrier; not simply railway rules that an obstinate shipper may decide to disregard. After October 1 the shipper of a dangerous article of any kind must certify on his shipping order that he has complied with the regulations of the Interstate Commerce Commission.

In preparing for the commission the new set of regulations, the bureau of explosives has been successful in securing the cooperation of interstate shippers. Practically all of the container specifications mentioned were drawn by committees of manufacturing shippers, a very practical evidence of their willingness to co-operate in promoting public safety.

The certificate to be signed by shippers will have to be in a form different from that now required, so that if old blanks are continued in use rubber stamps will be necessary to insert the new wording.

The new rules include specifications for iron or steel barrels or drums to be used in transporting inflammable liquids. These require that a drum with a capacity of 50 to 55 gals. shall weigh 70 lbs., and be of No. 16 gage metal, United States standard; a drum to carry less than 30 gals., No. 18 gage; one to carry 100 to 110 gals. to weigh 130 lbs., and to be made of No. 14 gage; every drum to stand a compressed air test of 15 lbs. per sq. in., and be designed to stand a hydrostatic test of 40 lbs. per sq. in.; and every drum must be able when filled with water to stand being dropped 4 ft. to a solid concrete floor without leakage.

No change has been made in the labels specified for packages or in the placards prescribed for cars. The shippers must furnish and apply the labels to their packages, and the carriers must supply the placards.

It was recommended by the bureau of explosives that the use of metal barrels or drums meeting these specifications be made compulsory for inflammable liquids having a flash-point below 20 deg. F. The commission did not approve this recommendation and adopted a rule permitting the use of good wooden barrels for these liquids, expressing the expectation that the use of wooden barrels would be gradually discontinued.

It will thus be seen that while the commission permits the use of wooden barrels, it has by the adoption of the metal barrel specifications prohibited the use of many of the grades of cheap metal barrels heretofore used for this service, and it has given at least a moral support to the contention of the bureau of explosives. It is believed to be only a question of time when the permission to use wooden barrels for such inflammable liquids as gasoline, will be withdrawn.

Another new and important feature of the rules relates to the transportation of inflammable liquids in tank cars. It is now specified that in order to be transported in a tank car, an inflammable liquid must not show a vapor pressure of more than 10 lbs. per sq. in. at a temperature of 100 deg. F. Not many of the shippers using tank cars have known heretofore anything about the vapor pressure of liquids shipped by them, and the serious accident at St. Louis in April last, was due to the transportation in a tank car of unblended liquefied petroleum gas

(casing head gasoline). Samples of this liquid have shown vapor pressures at 100 deg. F. exceeding 30 lbs. per sq. in.

This accident has also emphasized the necessity for some action on the part of the railways to insure that tank cars used for this dangerous service are selected from the best cars available. Not infrequently in the past, any tank car available has been considered satisfactory and no distinction has been made between the dangers involved in transporting in such a car highly volatile and inflammable liquids on the one hand, and lubricating oil, or cottonseed oil on the other. The tank car committee of the Master Car Builders' Association has been re-established, and this important question will be given serious consideration in the near future.

Colonel Dunn, chief of the bureau of explosives, has been conducting a vigorous campaign of education among the manufacturers of liquefied petroleum gas, a new and important industry, and has got many of them to supply themselves with the vapor tension measuring apparatus developed by the bureau of explosives working with a committee of manufacturers. The construction of this apparatus is described and directions for using it are given in a circular which has been issued by the bureau.

TRAIN ACCIDENTS IN JULY.¹

Following is a list of the most notable train accidents that occurred on the railways of the United States in the month of July, 1911. This record is based on accounts published in local daily newspapers, except in the case of accidents of such magnitude that it seems proper to write to the railway manager for details or for confirmation.

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train.	Kil'd.	Inj'd.
†3.	W. Jersey & S.	Lucaston.	xc.	P. & P.	2	17
5.	M., St. P. & S. S. M.	Superior.	bc.	F. & F.	3	3
5.	L. S. & M. S.	Ashtabula.	xc.	F. & F.	5	2
	N. Y. C. & St. L.					
*6.	Wabash	Litchfield.	rc.	F. & F.	1	2
13.	Southern	Granite Quarry.	xc.	F. & P.	0	6
15.	Erie	Portage.	xc.	P. & F.	1	8
17.	Penn.	Newark.	xc.	F. & F.	1	0
19.	Ann Arbor	Ann Arbor.	xc.	P. & F.	0	2
27.	Seaboard A. L.	Hamlet, N. C.	bc.	P. & F.	8	63
29.	Southern Pac.	Tracy.	xc.	P. & F.	0	2
28.	Bangor & A.	Grindstone.	bc.	P. & P.	9	24
*30.	Ches. & Ohio	Fire Brick.	rc.	F. & F.	1	1

Derailments.

Date.	Road.	Place.	Cause of derailmt.	Kind of Train.	Kil'd.	Inj'd.
7.	Mo., Kan. & T.	Bartlett.	unx.	P.	0	4
10.	N. Y., N. H. & H.	Westerly.	ms.	F.	1	3
†10.	Oregon Trunk	The Dalles.	d. track.	P.	2	20
11.	N. Y., N. H. & H.	Bridgeport.	exc. speed.	P.	15	50
12.	Balt. & O. S. W.	Dillsboro.	unx.	P.	0	20
13.	Illinois Cent.	Duquoin.	malice.	P.	0	6
16.	Mo., Kan. & Tex.	Bonham Jr.	ms.	P.	0	3
16.	Buff., R. & P.	Farmersville.	unx.	P.	0	6
16.	Chi. & N. W.	Tilford.	cow.	P.	0	0
16.	St. Louis & S. F.	Joplin.	cow.	P.	1	0
16.	La., R. & N. Co.	Edenborn.	unx.	P.	0	0
18.	Penn.	Anoka.	derail.	P.	0	5
19.	Balt. & O.	Bryant.	....	F.	4	2
19.	Denver & Rio Grande.	De Beque.	d. bridge	F.	0	0
19.	Colo. & Southern	Trinidad.	d. track.	P.	2	0
24.	Phila. & Reading	Coatesville.	malice.	P.	1	12
28.	Lehigh Valley	Burdette.	b. rail.	P.	0	40

Other Accidents.

Date.	Road.	Place.	Cause of Accident.	Kind of Train.	Kil'd.	Inj'd.
3.	S. P. L. A. & S. L.	Garfield.	boiler.	F.	2	0

¹ Abbreviations and marks used in Accident List: rc, Rear collision—bc, Butting collision—xc, Other collisions—b, Broken—d, Defective—unf, Unforeseen obstruction—unx, Unexplained—derail, Open derailing switch—ms, Misplaced switch—acc, obst., Accidental obstruction—malice, Malicious obstruction of track, etc.—boiler, Explosion of locomotive on road—fire, Cars burned while running—P. or Pass., Passenger train—F. or Ft., Freight train (including empty engines, work trains, etc.)—Asterisk, Wreck wholly or partly destroyed by fire—Dagger, One or more passengers killed.

The derailment at Bridgeport, Conn., on the 11th, due to disregard of signals and high speed through a crossover, was the most notable accident in July, the train being one which is frequently used by the President of the United States, and the location being easily accessible to a multitude of New York reporters; but the collisions in Maine and North Carolina two weeks later were of about equal gravity. The fifteenth death from the Bridgeport disaster occurred August 10. No important facts have been brought out in addition to those given in our account printed July 14, page 90. The rear brakeman who went back testifies that the distant signal was found by him properly set to stop the train. The frog was a No. 8 (slip switch), not No. 10. The distant signals for the two eastbound tracks are on a bracket post about 2,200 ft. in the rear of the home signals, and the home signals are on a like post near the cabin. The distant and the home signal for track No. 2 were both in the horizontal position and a dwarf signal, on the ground, at the entrance to the crossover indicated "clear." A railway officer, not of the New Haven road, who knew the engineman (Curtis) says that he was above the average engineman in intelligence and general ability. Curtis had been sick with measles, returning to work about three weeks previous to this date, and it is conjectured that his health was not fully restored; but no evidence has been produced either on this point, or as to whether he had a normal amount of sleep in the period—said to be six hours—in which he was in bed, before going on duty. The afternoon and night were extremely hot. The fireman had had several years' experience.

The collision at Hamlet, N. C., on the 27th, was between an excursion train carrying 912 passengers (negroes), and a freight train. Six of the 11 coaches were wrecked. Eight passengers were killed, and 62 passengers and 3 trainmen were injured. Most of the victims were in the third and fourth cars of the passenger train. The collision was due to an error of the despatcher, who notified the freight that all overdue trains had arrived at Hamlet, when such was not the fact.

The collision at Grindstone, Me., on the night of the 28th, in which five passengers and four trainmen were killed, and 22 passengers and two trainmen were injured, was between a southbound regular and a northbound excursion train. Both trains were moving at moderate speed, but yet fast enough so that the engine of the excursion train was pushed back through the car next to it, which was the smoking car; and nearly all of the passengers killed or injured were in this smoking car. Both engines were badly wrecked, and both firemen and one engineman were among the killed. The trains were to meet at Grindstone. The excursion train was the second section of a regular train and was inferior, by direction, to the southbound. It had encroached on the time of the other train one or two minutes. The engineman and the fireman of the excursion train were both killed.

The collision at Lucaston, N. J., on the third was due to the mistake of a brakeman who threw a crossover switch instead of a switch leading to a side track. His train, a westbound local passenger train, was to be backed into the side track to clear the main line for a following express train. In consequence of the mistake in setting the switch the local train was backed across to the eastbound main track just as an eastbound passenger train came along at high speed; and two passenger cars of the local were struck in the side and overturned. Two passengers were killed and 17 injured, all of them in the two coaches of the local train. The brakeman who threw the wrong switch is a man of experience. He was arrested and sent to jail on a charge of manslaughter. The two switches are only about a rail length apart. The reports indicate that the engineman of the local train was one not regularly assigned to that train, and that he stopped the train a little too soon, so that its rear car was just past the crossover switch but was not past the side track switch. It is said that he backed the train before the brakeman had given a motion instructing him to do so.

Electric Accidents.—Of the 14 accidents to electric cars reported in the newspapers as occurring in the United States in the month of July (and in nearly every one of which a considerable number of persons were injured), three are charged with fatal results. A butting collision at Fairhaven, Mich., killed one and injured 27. Another similar accident at Dearborn, Mich., killed one and injured 25, and one at Ridgewood, N. J., on the 21st, killed three and injured 12. In the last mentioned case one of the cars was an extra, and it was being run by the superintendent of the road; and he was killed. The collision was due to disregard of an automatic block signal. This signal had been struck by lightning and made inoperative, and the men in charge of the regular train (car), not having been informed that an extra car was coming from the opposite direction, proceeded on their timetable rights. This action of the conductor and the motorman was therefore in defiance of the lesson of a dozen years' experience with automatic block signals on single track lines, namely, that when such a signal indicates stop, whatever the cause, the only safe course, unless the line can be seen for a long distance, is to send a flagman ahead. Timetable rights and block signal rights cannot be thus easily interchanged.

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

XII.

OMAHA, NEB., JUNE 24, 1911.

My Dear Boy: You tell me that you are conducting labor negotiations these days. As I understand it, all the old grievances have been merged; after eliminating all demands introduced for trading purposes it is simply a question of more money. This simplifies the proposition. The union gets all that it can and the general manager gives up only what he must. Simple but barbaric. Such innocent bystanders as the public and the stockholders may get hurt in the process, but that is part of the penalty for being innocent bystanders. We are in a transition period. All the hot air fests that you are now holding are probably necessary to blow the chaff away from the wheat. Sooner or later the irrevocable law of supply and demand must operate to place the whole matter of the compensation of labor upon a more scientific basis. At present it is rather the strength of the particular union than the relative justice of its demands.

Our predecessors of two generations ago did many fine things, but they overlooked some basic propositions. Suppose that fifty or sixty years ago when a brakeman expected to be promoted to a conductor they had said: "Fine, my boy. You have the ear-marks of a conductor. You understand, of course, that we have no conductors who cannot run an engine. We will arrange, without money loss to you, for you to fire two or three years. When you assure us of your ability to run an engine we will begin to commence to talk about making you a conductor." Later on a man with this splendid all-around training could have specialized along the line of his greatest aptitude. We would not see freight tied up in terminals waiting for firemen, with a board full of extra brakemen. There would be an elasticity of assignment that would work out for the good of all concerned. We would not have the fireman straining his back to shovel fifteen or twenty tons of coal while a different breed of cat, a brakeman, rides on the fireman's seat and forgets to ring the bell when the train starts.

We blame the unions for expensive lack of interchangeability of function. The fault lies at the door of the official class. The master mechanic said: "This is *my man*." The superintendent, and later the trainmaster, said: "This is *my man*." This pleasing tenacity for so-called individuality left the company out of the reckoning. The company got it where the chicken got the axe, sweet Marie. It did not take the men long to respect the plane of cleavage which the officials had

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projected. So we have a number of unions with conflicting demands rather than the more enlightened self-interest of a larger body. I know that it has been fashionable to play one union against another, but the day of this is nearly passed. Just how it will all work out I do not know; perhaps it is too late to expect amalgamation. Perhaps it will come of itself when the firemen and enginemen absorb or replace the Brotherhood of Locomotive Engineers, and when the trainmen outlive the Order of Railway Conductors. Whatever the cause and whatever the existing conditions the result is plain. We have a number of forces operating to restrict the output of capable men. The economic machinery of society at large is therefore out of balance. You cannot blame the artisan, skilled or unskilled, for guarding the entrance to his craft. It is human nature, and it is right. The debatable ground, however, is as to where the entrance of the public at large should be to prevent the matter being overdone. No one labor organization can expect, in the long run, to be given preferred consideration over another; neither can the labor unions, comprising only a small percentage of the country's population, expect indefinitely to dominate society at large.

It is useless to expect to accomplish much in the way of increased elasticity of labor as long as railway officials, through so-called departments, insist upon narrowing and specialized rigidity. Such reforms to be effective must begin at the top. It will all come out in the wash, but in the meantime the laundry bills are disproportionate and may place cleanliness far beyond godliness.

General Sherman, one of the versatile geniuses developed by our great Civil War, once said that most men consider the immediate at the expense of the remote; that a few like himself were handicapped by considering the remote rather than the immediate; that really great men, like Grant, derived their title to greatness from an ability to balance the immediate and the remote. All men are more or less a product of conditions and environment. The railway official of today lives from hand to mouth—the hand of expediency to the mouth of rapid-fire results. When more roads are like the Pennsylvania in having the stability which admits of intelligent, far-seeing, actual control by directors and executive officers, it will be easier. The banker, from his condition and environment, dreads a war or a strike more than the famine and the pestilence. The former two seem to him to be avoidable, while the latter may be visitations of Providence. A strike, like a war, is a terrible thing to contemplate. A surrender to principle and violation of the broad laws of true altruism can be even more terrible. Last year when the Pennsylvania, backed by its directors, called the bluff of the trainmen, there was hope in many a breast that a lesson would be learned; that the rights of the community at large would be vindicated as against the unreasonable demands of the powerful few. How quickly did the trainmen find an excuse to back down. Their friend and advisor, the late Edward A. Moseley, shrewd and scheming, once told them that their best weapon is a threat of a strike and not the strike itself. By and by the bankers will learn these lessons and bargaining will be scientific and altruistic as well as collective and coercive.

Perhaps you are thinking that, like the minister who lectures the members present for the non-churchgoing of the absentees, I am taking too much of this out of you. We all know, as do the labor leaders, that no general manager ever went through a long strike, successful or unsuccessful, without ultimately losing his job. The directors start out with the best intentions of supporting him. As the struggle grows fiercer, the temporarily reduced earnings have a refrigerating effect on their feet. This cold storage is reflected by a message to the brain that the poor Mr. General Manager is so unfortunate; that he lacks tact. He is so rash. He jumps right in. We told him he might go out to swim and hang his clothes on a hickory limb. We cautioned him, as all prudent mothers should, not to go near the water. Everything in this world costs something, and

nothing is more expensive than an unjust peace, a peace which leaves out of the reckoning the rights of the body politic.

One of the hopeful signs of the times is the opposition the labor unions have offered to the exponents of so-called scientific management. Already our critics are giving indications of becoming our allies as against the hard-headed, selfish opposition of labor unions to progress. This will serve to help show the public our problems in their true light. All that we need ask is a fair hearing and ultimately the calm judgment of the American people will decide aright.

I have no quarrel with the labor union, as such. Were I in the ranks I would belong to a union and give it my loyal support. Monopoly and combination of capital beget as a corollary a labor trust. You and I are powerless to eliminate the effect of such natural, economic forces. We can, however, help control the effect of these forces, preferably by reason. There are so many of the primal instincts and passions still extant in human nature that at times diplomacy exhausts itself and falls back upon the protection of forces offensive and defensive, active and passive.

You see that it is merely a phase of a general problem that a disproportionate amount of your time is taken up by affording an opportunity for delegates to make their lodges believe they are earning their per diem and expenses. What matters it to the locomotive engineers if their importunities cause scant attention to the unspoken rights of your clerks and trackmen? Why not figure out just what proportion of your time the different organizations are entitled to, shut off senatorial courtesy and limit debate accordingly?

Whatever you do, have your division superintendents present at your negotiations. Do not flatter yourself that your own wonderful ability will enable you to take a sound position on every question that may arise. Such deliberations are staff work and, unlike line administration, are not a one-man function. The final decision should rest with you, but in the meantime get all the light you can. Under the unit system the superintendent can be thus spared from his division to help save the company money because there is always a competent man to perform his duties, and a provision all along the line for automatic successions to meet just such incidents of service. It should be as easy for a chief assistant superintendent, familiar with the routine, to assume the superintendent's regular duties any day as for the second despatcher to work the first trick. When your mechanical assistant conducts his shop negotiations, by all means insist that he direct the superintendents to send in each mechanical assistant superintendent to assist in the conferences.

One reason that the labor situation has gotten away from us is because the matter has been handled on too large a scale. The tendency has been to consider the abstract possibilities rather than the concrete effort. A superintendent of a 140-mile division once recommended approval of an application for increase in wages of his milk train crew, because the men on the next division were getting as much for running only 105 miles. Investigation showed that his men were on duty less than six hours, of which the total time consumed in handling milk cans was a trifle over one hour. Each general manager is inclined to believe that his men will get the worst of it as compared with other roads. He has been inclined to yield when he should have been firm. The further away from the concrete local conditions the negotiations can be conducted the more vulnerable are the officials. The labor leaders know this, and the more divisions or the more roads they can bunch in a single negotiation or arbitration the more unwieldy becomes the proposition and the greater the gain for labor. This condition of things was partly inevitable, is now partly avoidable. Uniformity may be deadly. Standardization can be run in the ground, as was shown when a West Virginia agent of the Chesapeake & Ohio painted his wooden-leg orange color with maroon trimmings.—

Affectionately your own

D. A. D.

BUFFALO, ROCHESTER & EASTERN APPLICATION DENIED.

For the second time the New York State Public Service Commission, Second District, has denied the application of the Buffalo, Rochester & Eastern for a certificate of public convenience and a necessity, and for permission to construct a railway across the state between Buffalo and Troy. The decision was unanimous. The commission passed adversely on a previous application on March 15, 1909, and the following year an application for a rehearing was made and granted. The grounds of denial on the rehearing are as follows:

1. That a reasonable and fair estimate of the cost of the railway proposed to be constructed by the applicant is not less than \$100,000,000.

2. That the principal use of the proposed road would be for through freight. That a part of the purpose is the serving of the localities through which the road would pass, but that it is not estimated or claimed by the applicant that the receipts therefrom would amount to more than one-tenth of the total receipts.

3. That the existing facilities for the carriage of through freight and passengers across the state are now adequate for existing business, and the service and facilities which can be furnished by existing railways will be adequate for a reasonable future period.

4. That the facilities afforded by the existing roads for the accommodation of local business are adequate. That the construction of the proposed road would be a greater convenience to these communities which are nearer to its proposed line than to the lines of existing roads, but that such greater convenience is not enough to make the proposed road as a whole a public necessity.

5. That the business which could be obtained by the proposed road would not be sufficient to pay operating expenses and a reasonable return upon the capital invested; and that the road would necessarily be bankrupt from the outset.

6. That the applicant has failed to show financial ability, resources, and connections sufficient to justify the belief that it could construct its proposed road.

7. That upon all of the facts shown by the evidence taken, the commission is unable to find that the said proposed road is a public convenience and a necessity.

The opinion of the commission was prepared by Chairman Stevens. The new evidence adduced upon the rehearing is exhaustively considered. The applicant admits that in order to be a successful road it must earn gross the sum of \$12,142,850 annually, and that of this sum \$10,792,650 must be earned by the carriage of through freight. An analysis of the situation at Buffalo is given, showing in great detail that the proposed road does not connect with the Grand Trunk at the International Bridge; that there is no place for a local freight station nearer the International Bridge than at Ontario street, beyond the point where the tracks of the Lackawanna cross the tracks of the Central. That it would be impossible, were the road constructed, for it to obtain a pound of freight from either lake boats or existing elevators without using the facilities of other roads which it is claimed are inadequate for handling the existing business. Passenger traffic could not be brought within 5½ miles of the center of the city upon the line of the road itself, and no freight could be brought nearer the business portion of the city than Black Rock, without resorting to existing facilities which the proposed road thinks should be superseded. This situation was brought to the attention of the applicant upon the hearing, but no attempt was made by it to show how these difficulties could be overcome, although months elapsed after its attention was called to the matter before the hearings were closed.

The commission says that the applicant has not shown that at any time since the former decision either the New York Central or any other road leading east from Buffalo has refused to accept freight from western connections, or failed to trans-

port the same, when accepted, without delay to the point of consignment. It has not shown any delays in handling any east-bound through freight coming from the West, either by rail or water, and delivered to existing rail lines at Buffalo, since 1907.

With one trifling exception it has not shown any congestion in the elevators at Buffalo since the former hearing. The case is practically barren of evidence showing delays in the handling of through freight. Daily reports to the commission as to cars supplied and car shipments at the elevators in Buffalo for a period of nearly a year show no failure in such car supply at any time. The conclusion is that there is no lack of facilities for the handling of the traffic which the proposed road is chiefly designed to serve, and that no claim of any failures or inadequacy of service has been made by the applicant in regard to this traffic. Facilities for handling that class of business from which the applicant proposes to obtain nine-tenths of its revenues are adequate, and that business is being handled satisfactorily. An enormous mass of evidence was taken on the handling of local traffic by the New York Central since 1907, the applicant calling some seventy-four witnesses who gave evidence regarding undue and unreasonable delays in the transportation of freight, and some thirty-five witnesses who testified regarding delays in furnishing cars when required for carload shipments. This evidence has been thoroughly analyzed and classified, and then the evidence of the Central in response thereto is analyzed with equal care. Numerous cases of alleged delays are cited, the answer of the Central is given thereto, and analysis is made of the actual service of the Central with reference to a large number of cars ordered and when the same were furnished with reference to the point of time for which they were ordered. The number of freight trains run by the Central, their scheduled and actual running time for a period of one month is given, the handling of large numbers of cars with reference to promptness and efficiency of service is reviewed, and as a conclusion the opinion says: "After the most careful and comprehensive study which the commission has been able to give to this enormous mass of evidence, treating the matter in its broadest aspect and making all allowances in every direction which good judgment would seem to require, it must hold, as it held upon the former decision, that the existing facilities are adequate for existing business, and it must hold, in addition thereto, that the service which has been given during the past three years, and is being given now, is of such a character as not to warrant the construction of another road for the purpose of affording additional facilities and relief from delays and inadequate service."

Complaints received from shippers during the year 1910 and 1911 do not indicate any chronic delays or congestion at any point. Attention is also called to the fact that no complaint whatever was made upon the hearing regarding the passenger service given by the New York Central; and also that, with but one break between Little Falls and Fonda, there is a first-class, high-speed trolley service the whole length of the state from Troy to Buffalo.

The cost of the road, if it is to pay a 5 per cent. return, would require a gross operating revenue of \$14,285,741, which would necessitate a gross operating revenue per mile of \$48,100. Complete tables have been prepared showing all of the freight handled by the New York Central during the year 1909, which the proposed road might have handled had it been in existence; the sources from which it was derived, and the place or places to which it was consigned are also given. The analysis of the mass of evidence relating to these freight shipments given by the commission is as follows:

Total of all traffic.....	5,739,767 tons
Total of all through traffic:	
Eastbound	2,528,211 tons
Westbound	526,769 tons
Total of all through traffic.....	3,054,080 tons
The applicant's estimate of the through traffic required is	6,541,121 tons
The actual amount of through traffic, as disclosed by the foregoing tables, is.....	3,054,980 tons
The shortage of the required amount is, being over one-half of the total amount required..	3,486,141 tons

Translating the situation into dollars and cents, the account would stand as follows:

Gross earnings required, according to applicant, upon through freight	\$10,792,850
Actual earnings	1,606,775
Shortage of required amount	\$9,186,075

In reaching this astonishing result it is assumed that the B., R. & E. would secure every pound of freight except that which it is certain the Central had already taken into its possession and would be required to surrender to get upon the tracks of the B., R. & E. Whether this is a violent assumption, requires no discussion.

The substantial accuracy of these figures is not questioned by the applicant, either by evidence or in its brief.

The commission also discusses the approaching completion of the Barge or Erie Canal. The evidence shows that it will be completed ready for traffic from Buffalo to Watervliet by the year 1915, and that its probable capacity will be about 15,000,000 of tons of freight annually. It is obvious that the capacity to handle 15,000,000 tons easily through this canal will have a most tremendous effect upon the freight situation. It is a factor which must be reckoned with in considering the financial success of the proposed road. Its existence is absolutely assured. It will compete for the identical freight from which the proposed road expects to derive nine-tenths of its revenues. It will be able to transport such freight at a lower rate than the applicant. The applicant upon the application for a rehearing intimated that it would produce satisfactory evidence as to its financial ability, and this was of great potency in inducing the granting of the application for a rehearing. But no new evidence of any kind having any legitimate weight was given upon the rehearing. All of the evidence that was offered is quoted at length and is characterized as ludicrous and absurd.

BAD PRACTICES MADE PUBLIC.*

GROUP V.

A. & B. R. R.—The practice on this road is for station agents to hire telegraph operators.

So far as could be ascertained, the road has no system of examining operators on standard rules, nor examination of operators for color blindness or fitness for the position of telegrapher. Many of the men claim that they never saw a book of rules, and many train-order offices are not supplied with one. Operators are not required to have standard watches. Many of them have no watches. Practically none of the offices are equipped with emergency hand signals.

C. & D. R. R.—At R operators were found completing orders before getting conductor's signature. This has been the practice at this station. At another station the third-trick operator was found working in excess of hours prescribed by law. First-trick operator gone fishing. Third-trick operator working first trick and using first-trick operator's signature.

This road has no regular examination of telegraph operators, and a majority of them have never been examined on operating rules.

E. & F. R. R.—On this road the operators in general or good, although a number of them have never been examined on the rules. In one important office the operators were found to be located in the same room with the station agent, ticket agent, and yard force, making it unsafe as concerns the blocking and train movements. The operators at this point are burdened with the clerical work for the agent, in addition to heavy telegraphing, as it is a heavy train-order point. The operator has the small telegraph table covered with expense bills and other clerical work, covering up block and train-order sheet, an element of danger. On some portions of this road it is common practice to indicate that a train has passed into a siding by

a whistle signal, instead of the conductor reporting to the operator that the main track is clear, as required by the rules. It is the practice also for a train despatcher to give operator a 31 order for a passenger train running late. When the passenger train has consumed what time is given on the order the despatcher tells the operator to file the order. The order should be annulled in accordance with the rules. Many offices were not supplied with signals as required by rules, such as red lamps and flags, torpedoes and fuses. At one station a farmer's lantern was being used in the semaphore as a signal lamp. Operator had to climb post to ascertain whether or not the lamp was burning.

At C operators handling train orders are in office used by yardmaster and clerks and public. Operators are continually harassed and interrupted in their work. At the time of inspector's visit there were 12 persons in the office beside the regular employees. It was also observed that when operators relieved each other they made no transfer. When the first-trick operator went off duty he had nine train orders on the table. He went out—said nothing to the second-trick man as to what orders or messages he had for trains.

G. & H. R. R.—On this road (and elsewhere) a signal failure is not reported as such unless it has caused a train detention, or is likely to be reported by some one other than the person in charge.

Of the interlocking plants on this road there are few that are provided with circuit plans, and in no case were these plans found to be correct. Absence of emergency hand signals, especially red lanterns properly filled, trimmed, and lighted, and placed ready for use in signal stations was frequently noted.

A signal repair foreman complained that he had very hard work to keep 5 men in his gang, his book showing that in the past year he has had 150 men on his roll. He could not keep them on account of low wages (\$1.35 a day). A recent increase of rate to \$1.50 a day has given him reason to hope that he can obtain a better grade of men and keep them longer than had heretofore been possible.

At one interlocking plant found to be in poor condition the red roundel and the lens in the lamp of a dwarf signal on an important connection were missing, and had been missing for so long that trainmen passing at night had formed the habit of going ahead and looking at the switch and derail by the light of their lanterns to learn their position before making the move.

One train was observed to pass a home signal with the blade only about 5 deg. below the horizontal. Investigation showed that the signal lever could be operated while yet the signal arm would not operate on account of fouling and improper adjustment of pull and back wires.

At another interlocking plant the combined manipulation chart and track diagram was found to be incorrect. Two electric locks were out of service, and jumpers placed around the contacts in both screw hand releases.

L. & M. R. R.—None of the operators employed during the past four years had been examined on the working rules. Many boys with little experience are employed. Chief despatcher informed inspector that it was almost impossible to keep competent telegraphers; he knew that some employed by the company were incompetent, and he had trouble with them, because of sleeping on duty and other minor offenses. Few offices were found equipped with emergency signals and very few had train-order transfer books. Rules of company require trains to be spaced 15 minutes apart. Operators are not living up to this rule.

GROUP VI.

A. & B. R. R.—One of the features particularly noted in an inspection of this road was that while automatic signals are provided on double track the protection on the stretches of single track intervening was much less complete. On a considerable portion of it a controlled manual block system had been in use

*From third annual report of the Block Signal Board of the Interstate Commerce Commission; conclusion of article published May 19.

for some time, but had been abandoned. In an automatic-signal installation, provided in certain suburban territory on this road, at one station a dead space of approximately 1,000 ft. on both northbound and southbound main tracks is left without track circuit.

One automatic signal was noted during inspection which was out of service on account of a defective insulated track joint. The signal had been out of service at that time for five days. Another automatic signal was reported as having been out of service for eleven days. It was alleged that the signals remained out of service for this length of time on account of the failure of track department to co-operate with the signal department in making repairs.

Surprise checking of enginemen, in their observance of signal indications, though but infrequently made during the past two years, had been revived and at the time of this inspection was being frequently made, and was found to be producing a good effect.

In one important office 12 changes in operators had been made in fourteen months. Operators in second and third tricks in this office at time of inspection were found not familiar with railway work; the manager informed the inspector that they were continually making mistakes, but they were retained because they were sober and industrious. A number of operators on this road had never been examined on book of rules; one operator when directed by the despatcher to cut in on another wire in switchboard, was unable to do so, never having had any instructions on the manipulation of the switchboard.

C. & D. R. R.—On this road, as on a number of others in this group, distant signals at various interlocking plants were found to be out of service. Another plant was found to be out of service on account of a derailment, due to misunderstanding by a freight conductor of hand signals given from signal tower by the signalman. The use of the caution card, instead of a hand signal, on this occasion, would doubtless have prevented this derailment, which caused heavy damage to the plant.

The inspector comments favorably on the very complete use of seals at a power-interlocking plant on this road to detect improper interference with the interlocking machine or the release. The use of these seals has led to a great improvement in the matter of "picking" or "plugging" indications on the interlocking machine.

Examination of the block records at a considerable number of block stations on this road shows that the records are not properly kept, some columns of the report not being filled out at some stations, while they are so filled out at others. These reports are required to be forwarded to the chief despatcher each day, and from the fact that they are continually sent in in an incomplete form, it would appear that they were inadequately checked in the chief despatcher's office.

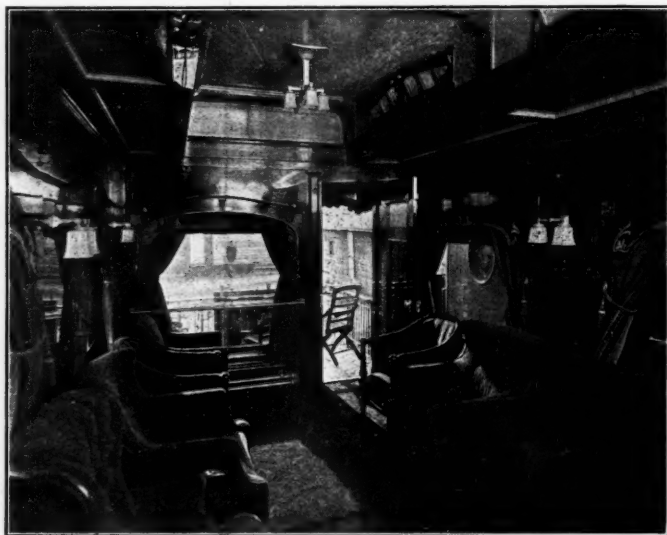
E. & F. R. R.—On this road the inspector found an incompetent and unsatisfactory class of telephone operators. Many young and inexperienced boys from the farms and others working during school vacations are employed with scarcely any examination on the book of rules. The superintendent informed inspector that it was practically impossible to get competent men to fill the positions on account of the low salaries paid (\$50 a month). There is an average of 70 per cent. changes in the telephone offices during the year. The operators were found to have no form of transfer to be signed in relieving one another, and, moreover, they were found to be very careless in giving relieving operators important information, concerning train orders, messages, etc. On a portion of this road, where absolute blocking is supposed to be the practice, it was found that the rules are not being lived up to.

Of the telegraph and telephone operators and signalmen visited on this road, 13 were classed as excellent, 9 good, 14 fair, and 9 poor. Of those classed as poor herein, the inspector described one as unsafe, one as a schoolboy and not much of a man, one as incompetent, and one as a careless and indifferent boy.

At one 24-hour telephone block office two of the operators had been taken from farms; the third had been a section laborer for a few months. These men were given only a few days' training before they were put into regular positions. The general yardmaster informed the inspector that these men were incompetent and were continually making mistakes. During a period of eight months, the third trick in another office was held by 16 operators.

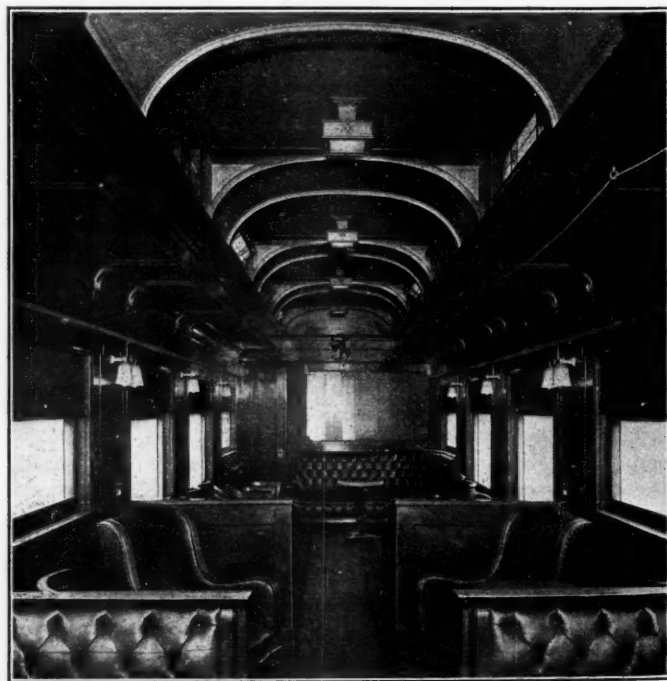
PULLMAN EQUIPMENT FOR THE CHICAGO GREAT WESTERN.

The Chicago Great Western has recently received several Pullman cars containing a number of improved and original features. The principal novelty is the ladies' observation parlor which forms a part of the new steel compartment sleeping car,



Ladies' Observation Room.

and is intended for the exclusive use of women passengers. It is 18 ft. long, and is furnished with luxurious chairs upholstered in frizette of goat's hair, and furnished in a delicate shade of green. A stenographer's cabinet, book cases and a magazine



Lounging Room in Men's Club Car; Chicago Great Western.

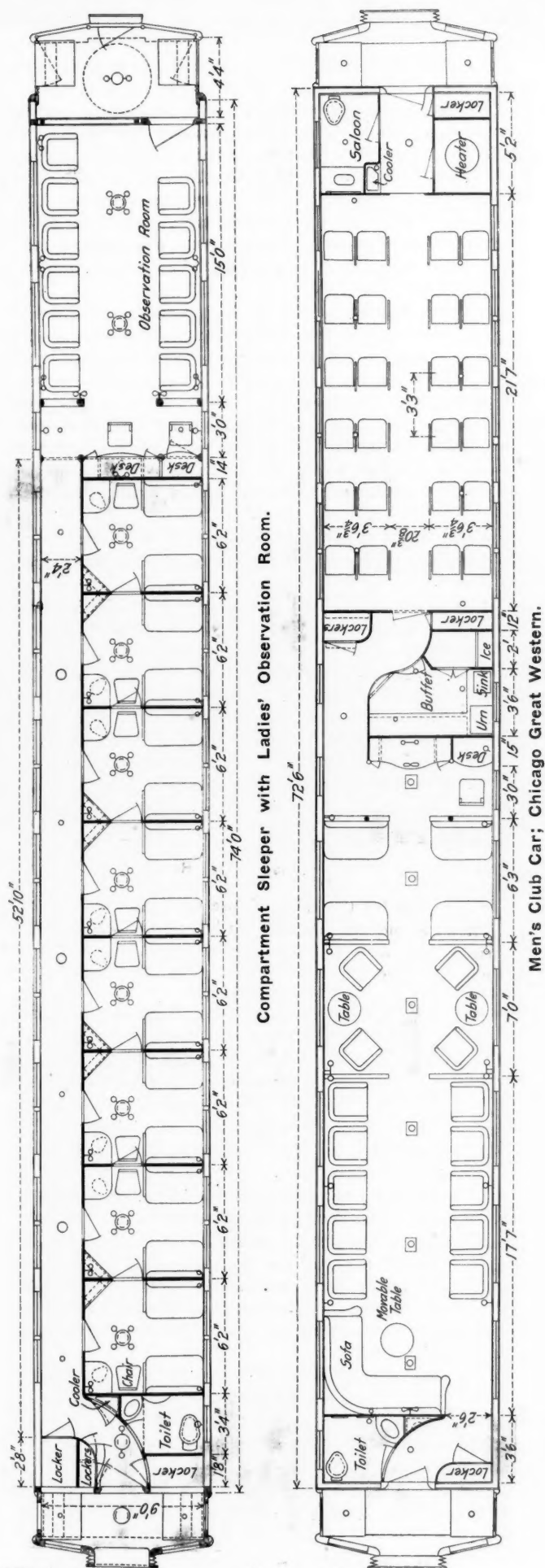
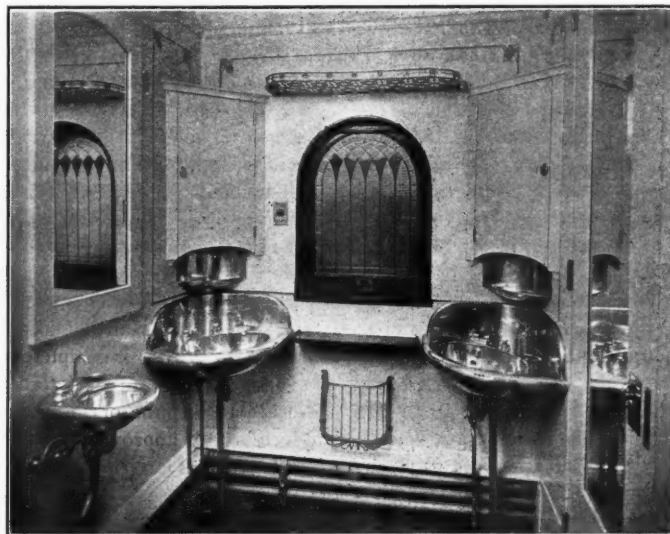


table are provided at one end, and at the other end, as shown in one of the illustrations, is placed a large window looking out on the observation platform. This platform is 4 ft. 4 in. deep, which allows ample room for two or three chairs. The interior of the car is furnished in Mexican mahogany with the twentieth century style of decoration. The front part of the car is divided into eight sleeping compartments, each being provided with an electric fan, a chair, wash bowl and closet. A dressing room is provided at the extreme end, which is finished with tiled rubber flooring and wainscoting. The car is 74 ft. long over the end sills, and weighs about 130,650 lbs. It is provided with the latest improvements to meet the special requirements of women passengers.

The men's club car, another interesting feature, is arranged with a buffet at the center, a reclining chair compartment at one end, and a smoking room at the other. The interior view shows the club room furnished with chairs, tables and a lounge at the end. It is divided into three sections; the end one is arranged for a general lounging room, the middle has a table and two chairs on each side, and the inside section has two side seats on each side. The interior finish is of oak, and the chairs are upholstered in dark red Spanish leather. The car is provided with a saloon at each end, and is arranged to provide exceptional comfort to the traveler. The length of the



Toilet Room in Sleeper.

car is 72 ft. over end sills, and weighs 146,500 lbs., each truck weighing about 21,950 lbs. The two other views show the interior of the new sleepers, which contain 16 berth sections and two toilet rooms. These cars are 74 ft. long and weigh 127,000 lbs., the trucks weighing 20,450 lbs. each. The cars all have steel underframes with center sills 26 in. deep at the center; the six-wheel trucks have cast steel frames.

The Norwegian State Railways have prepared a scheme for the construction of railways over a number of years, which it was hoped could have been based upon an annual expenditure of about \$1,600,000, as far as the exchequer was concerned, in addition to a smaller vote on the ordinary budget. It has been found expedient, however, not to exceed \$1,450,000 a year, which sum will be somewhat increased by local grants. The plan provides for the completion of the following lines: Otta-Dombaas, to be opened 1912; Aamli-Tveitsund, 1913; the Dovre Railway, 1916; Kongsberg-Gvarv-Notodden, 1918; Myrdal-Fretheim, 1919; Gvarv-Kragero, 1922; and Sunan-Grong, 1922. This entails an aggregate expenditure of \$16,000,000. This expenditure includes for rolling stock about \$800,000 for the Dovre Railway; \$420,000 for the Vestland Railway; \$270,000 for the Rouma Railway; and about \$210,000 for other lines.

RAILWAY LEGISLATION IN MASSACHUSETTS.

The legislature of Massachusetts, recently adjourned, passed a law enlarging the powers of the state railroad commission, an employers' liability law, and other important acts. The committee on railways was in session from early in the year nearly to the day of prorogation.

The session of 1911 has established a precedent in railway legislation in granting a certificate of exigency to the Boston & Eastern Electric Interurban Railroad Company, after the railway commissioners who had given numerous hearings on the petition, had refused, by a vote of two to one, to grant the certificate. This company proposes building a high speed electric road from Salem to Post Office Square in Boston, with a tunnel under Boston harbor, and with branches leading into Beverly and Peabody. There are now four roads serving this territory, in part, at least; the Boston & Maine (two lines), the Boston & Northern street railway company, and the Boston, Revere Beach & Lynn. Despite the vigorous opposition on the part of these roads, together with the opposition of the New York, New Haven & Hartford and the Boston & Albany, the legislature, by a decisive vote enacted the bill into law. The company has already filed its bond as required, and claims that within four years the road will be in operation.

Railway men say that this territory cannot support an additional road, and that the granting of this charter amounts to confiscatory legislation. The Boston, Revere Beach & Lynn, which would suffer the most, is being sought by the New Haven road.

An act passed early in the session and which has been adopted by many other states requires railways to furnish individual drinking cups on all passenger trains running thirty miles or more, with a sufficient quantity of pure drinking water, cups and water to be free. This bill was vigorously opposed by the roads, and the contention was made in open hearing that the people behind the bill are interested in the manufacture of these individual drinking cups and are using this means to force the railways to accept their product. But the legislature did not take the contention seriously and the bill went through and was signed by the governor in short order.

The bill setting forth the qualifications of locomotive engineers and conductors was the subject of protracted debates. In the form approved by the governor, it provides that no person shall act as a locomotive engineer unless he shall have been employed two years as a locomotive fireman or as an engineer's helper. No person shall act as a conductor on a railway train unless he shall have been employed as a brakeman for two years. A fine of \$500 is imposed for violation of the provisions of this act. The law does not affect men who have acted as conductor (or engineman) previous to June 10, 1911.

Another bill which is without precedent authorizes the town of North Attleboro to subscribe \$20,000 towards the building of the Boston & Providence Interurban Electric Railroad Company for the purpose of securing a location in a specified section of the town. The route to be adopted by the road has only very recently been approved by the railway commissioners.

The powers of the state board of railway commissioners have been greatly increased by Chapter 755. Whenever the board, after hearing, holds a rate unreasonable or unjustly discriminatory or insufficient to yield compensation, it may, with due regard to a reasonable return upon the value of the carrier's property, determine just and reasonable rates, etc.; and similar power is given to regulate practices, equipment, appliances and service; but rates and facilities which have been fixed by statute shall not be meddled with. The board may employ experts to examine into the rates, facilities and financial condition of railways, and may spend \$5,000 a year for the salary and expenses of an accountant. The attorney general (or one of his assistants) is to be the counsel of the board, and also may appear before it in any matter on his own motion, when he or the board deem such action necessary in the public interest. Every order

of the board shall continue in force unless set aside by the board or by a court.

The railway commission was empowered to relax the restrictions imposed by law on the running of street cars across the tracks of standard steam railways. A law was passed providing for the consolidation of the Boston Elevated and the West End Street Railways; the vote of the stockholders of the companies to be taken by or before September 15. Another law changes the basis for the taxation of legacies of non-residents. Where owners of railway, telegraph or telephone stocks, living in other states, leave such property, Massachusetts will assess a tax on a part of the legacy, in proportion to the part of the company's line lying within that state.

A bill that became law despite the absence of the governor's approval provides that railways issuing season tickets shall, at the request and on the presentation of a season ticket by the holder, place the same on deposit for not less than one week and reissue the ticket at the request of the owner; in other words, the passenger may take a vacation (but not more than once in three months) and not have to continue paying fare while he is away. The railways are required to reimburse the holder of a season ticket who pays fare because of having forgotten to bring with him his season ticket.

The state board of railway commissioners is required to make an investigation and a report concerning charges for commutation tickets.

The "Workingmen's Compensation act" is of vital importance to railways. This act was signed by the governor July 28, and in an opinion given by the justices of the supreme judicial court to the Senate, July 24, approving the bill as being constitutional, it is described by the court as "a radical departure in the manner of dealing with actions or claims for damages for personal injuries received by employees in the course of their employment."

The principal provisions of this act are as follows:

First: Except as to domestic servants and farm laborers, the following defences of employers are repealed by the statute—

- (1) That the employee was negligent.
- (2) That the injury was caused by the negligence of a fellow employee.
- (3) That the employee had assumed the risk of the injury.

Second: The employer may take his chances with his employee, with the above defences repealed, or he may protect himself against their claims, and those of their representatives and dependents in case they are killed, either by becoming a subscriber to the Massachusetts Employees' Insurance Association, a mutual liability insurance company created under Part IV of the act, or by insuring the liability to pay the compensation provided for in the act, in any company—stock or mutual—authorized to do liability business in Massachusetts.

Third: The amount of compensation an injured employee or his representative and dependents may recover, is roughly as follows:

(a) For the first two weeks after the injury no compensation except reasonable medical and hospital services.

(b) In case of death, payments are to be made to dependents equal to one-half the workman's average weekly pay for the preceding 300 weeks—maximum amount \$3,000—partial dependents to receive compensation in a lesser amount. If there are no dependents, expenses of burial and last sickness up to \$200 are to be paid.

(c) In case of total incapacity, payment is to be made him equal to one-half his average weekly pay for the preceding 500 weeks—maximum amount \$3,000.

(d) In case of partial incapacity, payments are to be made him equal to one-half the difference between his average weekly pay before and after the accident, but the payments in no case shall extend over more than 300 weeks or exceed a maximum of \$3,000.

(e) In case certain specified serious injuries are received,

there shall be paid, in addition to the above amounts, sums ranging from \$120 to \$1,000.

Fourth: Compensation as provided in this act will not be paid if an employee is injured by reason of his own "serious and willful misconduct," but if the injury of the employee is due to the "serious and willful misconduct of his employer," or "of any person regularly entrusted with and exercising the power of superintendence," the sums enumerated are to be doubled.

Fifth: Every employer must keep a record of injuries received by his employees in the course of their employment, and report the same in detail within 48 hours of the occurrence, under penalty of a fine of \$50 for each failure.

Sixth: The act provides in considerable detail for the establishment of an "industrial accident board" which is given general supervision over all parties affected by the act, and which is clothed with quasi judicial powers.

Seventh: The act establishes a mutual liability insurance company to which employers are entitled to subscribe, as before noted.

Eighth: The act takes effect July 1, 1912, except such portion thereof as authorizes the creation of the Massachusetts Employees' Insurance Association, which portion takes effect January 1, 1912.

HEATING CARS CONTAINING PERISHABLE FREIGHT.*

BY E. F. M'PIKE,

Refrigerator Service Agent, Illinois Central.

The heating of cars loaded with perishable freight may be divided into, first, heating at terminals or reconsigning points; second, heating in transit. In both cases a considerable amount of this work is done by the shippers themselves at their own risk and expense. Shippers of potatoes, from Wisconsin and Minnesota, for example, send their own messengers along in charge of lighted fires in coal stoves; and when such messengers abandon the cars, the fire is supposed to be extinguished, as the carriers feel that they have done their part in affording free transportation for the messenger to go with the car to the Ohio river, and for his return when he has accompanied two or more cars in one train.

There are serious objections to allowing such cars with lighted fires to move without the supervision and constant care of shippers' messengers. The carriers could not undertake to replenish the coal in the stove, nor to look after it in transit. The larger shippers of potatoes have their own representatives on the track to look after the heating of cars held at Chicago, or other large terminals for disposition or reconsignment. Shippers having a large number of cars to handle are in a position to do this work economically.

The beer shippers, also, during cold weather often forward a portable heater with their cars.

This paper relates more particularly to heating service performed by the carriers when necessary, and we may consider first, the heating of cars standing on team tracks at terminals where they are held for unloading or reconsignment. It is, of course, desirable that consignees be urged to unload promptly or make early disposition of the cars. In any event it is desirable that some definite instructions in writing be obtained from the consignees as to the protection or non-protection to be given cars so held; that is, whether by placing one portable heater in the ice tank at each end or otherwise. There are, of course, certain commodities the nature of which renders it impracticable to protect them by the use of artificial heat. The whole question of heating cars on team tracks, or at terminals, or to avoid round-housing, with consequent delay, involves, first, the selection of a suitable, reliable and economical apparatus for heating, and second, the securing of definite instructions from the owner of the goods, whenever possible to do so.

When we approach the question of heating in transit, we find a somewhat larger and more difficult problem, because, it is not so easy to give the heating apparatus in cars in transit frequent inspection or constant supervision as to give such inspection and supervision to the heating apparatus in cars on team tracks. The practice of heating in transit has not become generally recognized, or firmly established on a uniform basis. It is a special service, additional to the transportation service, and if it is furnished by the carriers they are, of course, entitled to reasonable compensation for it, which feature of the matter is being investigated on its merits.

Methods of heating in transit may be divided into two classes, first, by the use of permanently equipped cars; second, by the use of portable heaters. The permanently equipped car for heating, has at first sight, certain advantages, particularly if the cars can be kept in assigned runs, and if there is perishable freight requiring heated service in both directions. But the use of an assigned car for heat, whether it is equipped with steam pipes or any other apparatus is very apt to produce a large amount of empty back haul of equipment in order to have the cars to protect assigned runs. If such cars are loaded back to the original station with dead merchandise or other freight not requiring heating, there may be delay in unloading them, when they must be made available for re-loading to protect assigned runs. Further, some of the permanently equipped cars might get into bad order and thus deplete the number of cars available to protect such assigned runs, which might mean default on the schedule and consequent complaints and trouble.

Some more or less extensive experiments have been made by certain carriers with steam heating apparatus in refrigerator cars, but so far they have not been entirely satisfactory. It is not always easy to heat passenger coaches, and the difficulty certainly would be no less in the steam heating of refrigerator cars in transit. It would be a question of equipping engines, also principal freight terminals; and then a steam heated car loaded with perishable freight might get into bad order and have to be set out somewhere in transit where steam facilities were not available, or might arrive Saturday night or Sunday morning, and have to be held over until Monday morning at a destination where steam heating facilities did not exist. It is possible that on certain long haul traffic, a plan might be worked out satisfactorily for the steam heating of refrigerator cars, if a reliable, constant and durable steam apparatus could be furnished.

Some of the New England roads handling a large quantity of potatoes from Maine, etc., have been using permanently equipped cars containing heaters which burn kerosene without a wick. Having had neither personal experience with such apparatus, nor complete information about it, I cannot state positively the results, but it has been said that this service was not in all respects absolutely satisfactory and that some fire risk is involved and other trouble encountered, owing to the care and attention required by such heaters. Experiments are also being made with a heater to burn denatured alcohol, and it is now stated that a number of cars so equipped will be in service next winter. The stove burning denatured alcohol is said to have certain parts which require some care and attention for proper adjustment or operation, and it will be very interesting, indeed, to learn the final result, in view of past experience with all other apparatus using oil as a fuel. There is also a question as to the relative cost of denatured alcohol as compared with other available fuel.

Suitable false floors should be furnished when possible in heated refrigerator cars, so as to permit a circulation of warm air under the load, such floors to be of proper design to facilitate trucking while freight is being loaded.

At the present time, as recently stated by the Service Committee of the Railroad Refrigerator Service Association, in its circular No. 22, it seems absolutely necessary for the carriers, generally speaking, to rely upon a portable heater, which can be placed in any car, at any time, at any point, as needed. This

*A paper read at the meeting of the Peoria Division, American Association of Railroad Superintendents, at Peoria, Ill., June 20, 1911.

brings us to the question of the relative merits and reliability of the different portable heaters. The beer shippers and certain railways have been using different types of oil stoves, burning kerosene, but trouble has been experienced with the wick going down, extinguishing the fire or creeping up, and causing smoke and soot, resulting in either case in unsatisfactory service, complaint, and more or less damage to the contents of cars. There have been some explosions of kerosene oil stoves, with consequent fires. Efforts have been made to design such stoves so that the wicks can be securely fastened in place, but at the best an oil stove is not automatic and requires intelligent and close supervision from time to time. They are not generally speaking, durable and is considerable overhauling or replacement is necessary so that they are not economical or satisfactory, but have been used in the absence of any suitable portable heater. They can be taken out of the car at destination and sent back by express or baggage, thus releasing the equipment for other service and preventing empty back hauls of cars.

Under this condition of affairs, the Illinois Central about January, 1910, made in its own shops after the design of one of its own men, a heater to burn charcoal. The experiments with it were so encouraging that five more charcoal heaters were built in the shops during the spring of 1910. The tests as a whole gave so much promise of better service than that previously obtained with oil stoves, that the Illinois Central, early the following winter purchased sixty charcoal heaters of improved design, having still five of the original heaters in service, making a total of sixty-five charcoal heaters, which were in constant use during at least the months of January and February, 1911, and with very satisfactory results. These heaters were of a large design to place in the body of cars containing L C L shipments. Some of these cars were permanently equipped with heaters to protect assigned runs and short hauls locally between stations where heated car service was needed in both directions. On several schedules from Chicago, outbound, however, to stations in Iowa, the heaters were taken out at ultimate destinations and sent back by baggage cars as far as Freeport, Ill., for transfer at Freeport into the regular Chicago in freight house merchandise cars. By this plan, the heaters were always returned promptly to Chicago and made available for re-use on the assigned schedules. One of these schedules from Chicago was to Sioux Falls, S. D., which is a haul of 548 miles. These cars, initially supplied with charcoal at Chicago, were waybilled for inspection at Waterloo, Ia., where the heater was always found burning satisfactorily, and where it was re-supplied with charcoal. The cars on arrival at Sioux Falls had, practically every trip, more charcoal remaining than the quantity put in at Waterloo, showing that the initial supply of charcoal at Chicago would have been sufficient to carry the car through and keep the heaters burning until arrival at Sioux Falls, but the inspection at Waterloo and the replenishing there with charcoal were a safe-guard on this long haul. The reports from the agents at Sioux Falls and other points were invariably favorable and indicated reliable and satisfactory service. The charcoal heaters are automatic, having a magazine which feeds the charcoal by gravity, and require no supervision in transit.

The jarring caused by trains in transit, which was the cause of so much trouble with oil stoves, is beneficial to the charcoal heater, because it helps the feed of charcoal by gravity from the magazine down onto the fire pot.

The supervisor of fire protection on the Illinois Central has carefully examined the charcoal heaters, and has declared that they involve very much less fire risk than oil stoves, and he prefers to see them used exclusively. Arrangements were made to have a suitable supply of dry charcoal of good quality sent to our car shops at Burnside, Ill., where under intelligent supervision, it was crushed into uniform pieces about the size of a hickory nut, and put into bags holding 50 lbs. each, which being kept dry were sent to our agents at Chicago and other points from which our heated schedule cars operate. A memorandum

was furnished our Burnside shops of the exact amount of crushed charcoal which would be needed by all our forwarding agents each week, according to the number of scheduled cars. By establishing this system and having the forwarding agents telegraph in ample time, before their supply of charcoal was exhausted, no difficulty was experienced in maintaining the necessary amount of charcoal at each point, and it was found possible, at the larger stations, to store a large quantity of charcoal to provide for emergencies. It would have been possible to send a bag of charcoal along in each car with the heater, but this was not found necessary. The whole success of the charcoal heaters depends on the use of dry charcoal of good quality, crushed into pieces small enough to feed easily by gravity. The charcoal heater has no dampers or drafts, no parts requiring adjustment in transit, and therefore, is very simple and automatic. The charcoal heater seems to be of very durable design, requiring practically no replacement, except perhaps a fire pot lining once a year, costing about 40 cents. All these facts tell their own story, and it is gratifying to have found a reliable and portable apparatus for heating refrigerator cars. A new design of the charcoal heater of smaller dimensions has since been made to go in the ice bunkers of carload shipments, so as not to disturb the lading. One of these bunker heaters at each end of the car is expected to furnish ample heat to protect the contents of cars during extreme cold weather, and there seems to be reason to anticipate a widespread use of this bunker heater next winter. One thing is certain: the use of kerosene oil stoves is drawing to a close.

Successful tests of the charcoal heater have also been made by the Chicago & North Western and certain other railways.

It is understood that some of the trolley lines are using electric radiators, for which they have the necessary power, and are advertising frequent heated car service to country crossings. There is a constantly increasing demand each winter for heated car service.

Railways are entitled to reasonable compensation for heated car service when they supply it, and in due course will no doubt publish proper charges for such service, which is being extended from year to year. The New England roads have for some time had tariffs in effect publishing minimum charges for heated car service in carloads, ranging from \$10 to \$24 per car per trip, according to the style of the car and the length of the haul. In some cases an extra charge of 10 per cent. or 15 per cent. above the regular freight rate is made for less-than-carload-heated service.

FOREIGN RAILWAY NOTES.

The construction of the Wagga to Tumbarumba railway, Australia, has been strongly recommended by the public works committee. Agitation for this line has extended over 25 years. The district is adapted for mixed farming, and is capable of a supporting dense population.

Substantial progress has been made during the last twelve months with the construction and equipment of the Benguela Railway, Portuguese West Africa, and traffic is now running up to the railhead, 200 miles from the sea. This railway runs from the port of Lobito, on the west coast of Africa, eastward through Portuguese Angola toward the Belgian Congo, and it is proposed ultimately to extend it to join the Rhodesia railways and the Cape to Cairo line. The portion from 123 miles to 200 miles was completed in October last. A contract has been arranged for the construction and equipment of a further section extending up to 223 miles, and the surveys for the line up to Mutota, 559 miles from Lobito, are to be completed by the end of June. The total distance from Lobito to the Kongo frontier is estimated at about 807 miles. The gage is 3 ft. 6 in. Lobito possesses one of the finest natural harbors in Africa, with a substantial timber jetty that is capable of accommodating the largest steamers running to South Africa.

Maintenance of Way Section.

THE twenty-ninth annual convention of the Roadmasters' and Maintenance of Way Association, will be held in the parlors of the Southern Hotel, St. Louis, Mo., September 12 to 15. Reports will be presented by the various committees and discussed at the convention. The Track Supply Association will have a display of appliances in the lobby of the hotel.

THE necessity for proper drainage of roadbed and the direct relation between this and the cost of track maintenance are fully realized. Drainage problems are met with so frequently and have been worked out in so many ways that the number of contributions to our contest on this subject should be large. All papers should be sent in promptly and must reach this office not later than September 1. All methods of handling track drainage problems may be treated of in the contest, and special attention will be given by the judges to those methods capable of the widest application. The papers should describe clearly the local conditions before the drainage work was begun, as well as the method adopted. Prizes of \$25 and \$15 will be awarded for the best two contributions, while all other papers accepted for publication will be paid for at regular space rates. All contributions should be sent to the civil engineering editor of the *Railway Age Gazette*, 417 South Dearborn street, Chicago.

TWELVE contributions were received in the Bridge Kink contest, which closed August 1. The judges—C. F. Loweth, chief engineer of the Chicago, Milwaukee & St. Paul; W. H. Finley, assistant chief engineer of the Chicago & North Western, and L. J. Hotchkiss, assistant bridge engineer of the Chicago, Burlington & Quincy—awarded the first prize to S. C. Tanner, master carpenter of the Baltimore & Ohio at Baltimore, Md., for his description of the gallow frames for placing girders; and the second prize to J. T. Frame, engineer maintenance of way of the Chicago Great Western at Clarion, Iowa, for the description of a method of shifting a trestle deck. Other papers which have been accepted were sent in by: M. Riney, foreman bridges and buildings, Chicago & North Western, Baraboo, Wis.; L. C. Lawton, division engineer, Atchison, Topeka & Santa Fe, Newton, Kan.; F. Burrell, general foreman bridges and buildings, Chicago & North Western, Fremont, Neb.; G. LeBoutillier, division engineer, Pennsylvania Lines, Cincinnati, Ohio; H. C. Arter, bridge foreman, Chicago, Burlington & Quincy, Jacksonville, Ill.; and E. R. Lewis, division engineer, Michigan Central, Bay City, Mich. These papers are published in this issue. The contest brought out a number of practical bridge kinks, but a much larger number are to be found in the field. For this reason we expect to announce a contest along similar lines in a few months.

ALMOST the entire attention of railway men in charge of tie supply today has been directed towards preparing ties for great resistance to decay, to the neglect of the proper handling of the tie to render the treatment most effective. It is inconsistent for roads to spend a large amount of money for the treatment of ties and then allow the use of picks when placing the ties in the track. The preservative extends but a short distance into the wood and a pick penetrates this coating whenever it is driven into the tie. In placing the tie in the track several such holes are made, all of which are pockets for the collection of water. At such points decay begins just as if the tie had never been treated. Some roads provide tie tongs for handling ties, while others still provide only picks. One roadmaster, who evidently realizes the injury resulting from the use of picks more than do his superior officers, who have repeatedly refused to furnish him tie tongs, requires his men to stick the pick only in the center third of the tie, as this part is ordinarily the last to fail. The

pick is used even more frequently in handling a treated tie than an untreated one, because of the action of the preservatives on the skin. The use of tie tongs when handling treated ties is certainly proving economical, for, in addition to eliminating injury to the tie, they are more convenient to use and the tie can be more easily placed. They are inexpensive in first cost and can either be purchased in the market or readily made in company shops.

IN the past, for some reason, less attention has been given to economy in track work than to the standard of maintenance. Today, while not slighting this standard in any way, the cost must also be considered. To meet this demand the track man must be impressed with the value of both labor and material. If he knows that a ton of freight must be hauled 90 miles to pay for one track shovel he will not be so quick to throw it in the scrap heap. When he knows how much his tie renewals are costing him he will try to devise some way to reduce his unit cost. If he also knows what his neighbor's work is costing the spirit of rivalry spurs him to do his work cheaper than the others. The supervising officer (superintendent, roadmaster, master carpenter or supervisor) should not only know the amount of work each foreman is doing, but also what it is costing. In most cases, he knows only the first item. When he has the unit costs of the work of all his gangs before him he can readily locate the weaker foremen and help them remedy the difficulty. Many times he will be surprised to find that the man whom he considers one of his best is at the same time one of the most expensive. Cost data should be kept as the work progresses, so that weak points can be strengthened at once. Figures furnished months after work is completed are of little value compared with those prepared for the use of the men doing the work at the time they are doing it; but it is in only a few instances that such figures are kept. Believing that a more general use of cost data will result in savings in the maintenance of way department, the *Railway Age Gazette* is conducting a contest on Methods of Keeping Cost Data in Maintenance of Way Work. All methods of keeping such data and getting it before the men who are doing the work may be described in this competition. The plan should be given in detail, as well as the results secured, and the amount and cost of the clerical labor involved. Prizes of \$25 and \$15 will be awarded for the best two papers, while our regular space rates will be paid for all other contributions accepted. All papers must be in the hands of the civil engineering editor of the *Railway Age Gazette*, 417 South Dearborn street, Chicago, not later than October 1.

THE method of renewing ties to face advocated by Mr. Trabue in an article in this issue will be considered by most railway men as very radical. When viewed from the standpoint of past and present practice, it is so. It is a question, however, whether these objections that will be raised to it will not arise more from adherence to long-established practice and general opinion than from a definite knowledge of the actual costs involved. The greatest objection is that of waste of ties, and, while it is true that the maximum life is not secured from all the ties, the figures presented show that this waste, in the case considered, is more than offset by the saving in labor resulting. No one will deny the effect the yearly disturbance of the track during tie renewals has on the amount of labor necessary to maintain that track in proper condition. The entire question resolves itself into a study of whether this saving in track labor is sufficient to more than offset the increased outlay for ties. Attention in general has been fixed on securing the maximum life from the ties, and but little thought has been given to the question of the labor involved. Some may attribute economy in this instance to the fact that work in this case was done in a part

of the country where ties are worth but 40 cents apiece as compared with 50 and 60 cents in the northern states, but it must also be remembered that labor is secured in the South for about \$1.10 per day as compared with \$1.50 in general. Thus, the ratio remains about the same. If Mr. Trabue's figures for the entire life of the ties work out as he anticipates, the experiment will become a powerful argument for the treatment of ties. If it is economical to renew to face ties having an average life of six years, it is of far greater advantage to thus renew ties having a life of 8, 10 or 12 years. It is to be regretted that more roads have not kept figures of the actual cost of the various items of track work involved here. A recent attempt to gather such data from several of the large roads revealed the fact that practically no such figures had ever been collected. In this regard, Mr. Trabue has an advantage in that he has kept actual cost data on all his investigations. It is to be hoped that this study will lead other men to investigate the question more fully and gather statistics of cost under their own operating conditions. We shall be very glad to receive further data on this subject which other men may have collected.

RAILWAY FORESTRY OPERATIONS.

THE record of the Pennsylvania Railroad's success in forestry operations, described in another column, is particularly important since conservative logging has scarcely been tried by railway foresters. The necessity for the conservation of timber resources in this country has become a popular cry in recent years, and railway managers have not been slow in recognizing it. Most of the large roads now have an officer in charge of some phase of the work of producing, preserving or utilizing timber, and much progress has been made in this line. Attempts by the roads to increase the production of timber have been directed principally to planting trees on waste lands, and in several instances this work has advanced beyond the experimental stage. It is urged in favor of such planting that, in addition to raising timber, the plantations serve as a protection against soil erosion, and in some cases against drifting snow, and that they are valuable as object lessons in conservation to farmers along this line. But the total amount of land now available for such planting, or which could be secured at a reasonable price, is entirely inadequate to produce the timber needed for railway consumption, and it would be impossible to plant trees fast enough to insure an adequate tie supply, even if money and land were available. Another objection to extensive work of this kind is that the expenditure necessary for the work cannot produce returns for many years, 30 or 40 years being about the average period in which standard ties of common species can be grown.

Foresters are practically agreed that if a supply of timber is to be assured for the future it must be done in the main by managing existing timber land and not by planting. It is not generally realized how much waste there is in the present methods of logging and milling. This waste is especially great in the production of hewed ties. It is customary to select only the younger and straighter trees for ties, making only one tie from each tree. A tree from 10 to 14 in. in diameter is still growing very rapidly, and a much greater timber production per acre could be secured by allowing these trees to mature before cutting. In present practice many trees of tie size are left, because for some reason they are difficult to log, and it is estimated by the government forestry bureau that by taking all trees of the tie size on the area now cut over, the yield per acre could be increased from 60 to 125 ties. If the trees now taken were allowed to mature this yield could be increased by 170 ties per acre. There is also considerable waste in cutting the stumps high and in not sawing the log so as to make use of the greatest amount of timber. It is estimated that the saving possible by the application of proper methods in milling is 25 per cent. On the basis of these estimated savings, the area which is cut over each year under the extremely wasteful methods now commonly used could easily be reduced about two-thirds, and at the same time

the net return for each acre would be considerably increased.

Forestry bureau statistics show that the annual consumption of lumber in the United States is about 60 billion board feet, of which the railways consume approximately 15 per cent., or 9 billion feet. The annual growth of timber per acre in a properly managed forest is about 400 board feet, although much higher yields than this are obtained in European forests, and, no doubt, could be obtained in this country if proper methods were adopted. It is, of course, impossible to utilize this entire growth in the finished product, but it can be assumed that under proper conditions at least 75 per cent. of the growth can be so utilized, and on this assumption 300 board feet could be secured from each acre each year. On this basis 30,000,000 acres of forest land, properly managed, would supply all the railways in the country with lumber at the present rate of consumption for an indefinite period. The annual consumption for all purposes, nine billion feet, is being constantly reduced, however, and, on this account, the above figure is considered a conservative estimate. When it is remembered that a very small number of railways now hold over 10,000,000 acres of timber land, it is evident that no very extensive purchases of private property by railway corporations would have to be made to enable the companies to produce all their own timber.

Some railway managers object that forestry operations provide for the future at the expense of the present. The best answer to this argument is the immediate saving in the cost of lumber made by the Pennsylvania Railroad by managing but a small tract of timber land. A considerable profit was shown in the first cutting on a very badly mutilated second growth forest, the entire expense of preparing the tract for producing a maximum growth in future cuttings being counted in the cost of production. Future cuttings on this same tract will show much greater profits. If it is true that a railway management can net \$12,000 in three years on a small tract of only fair timber in addition to providing itself a supply of lumber for the future, it is time the policy of managing timber lands now owned and of securing other timber lands which can be managed be generally adopted.

ENGINEERING ARTICLES SINCE JULY 21.

THE following articles of special interest to engineers and maintenance of way men, and to which readers of the engineering and maintenance of way section may wish to refer, have appeared in the issues of the *Railway Age Gazette* since July 21:

The Procedure of Technical Associations.—E. L. Corthell; in a letter to the editor, comments on proper procedure at technical association conventions, as exemplified in a recent European congress. July 28, page 164.

Coal and Ore Docks of the Baltimore & Ohio at Lorain, Ohio.—The Baltimore & Ohio's ore and coal handling plant at Lorain is one of the best examples of a modern plant for the mechanical handling of these commodities. The engineering features of the building of this plant and details of the unloading machinery and power supply are included in an illustrated article on page 178 of the issue of July 28.

College Men in Railway Work.—A continuation of the series of comments on this subject, signed by "Yale, 1894," appears in the issue of August 4, page 204.

Substructure of the Kentucky & Indiana Bridge.—One of the large bridge projects now under way is the replacing of the old Kentucky & Indiana bridge over the Ohio river at Louisville, Ky. A detailed description of the substructure work, with a number of illustrations, appears on page 208 of the issue of August 4.

The new manual of the American Railway Engineering Association, which has recently been completely revised and carefully edited, is reviewed on page 277 of the issue of August 11.

The North Coast Railroad.—The building of the North Coast Railroad has attracted wide attention and is one of the important steps in the development of the far Northwest. The connections which the new line will make with existing lines, the unusual features in its construction, and a number of photographs of work along the line are included in an article in the issue of August 11, page 283.

Ductility in Rail Steel.—P. H. Dudley, consulting engineer of the New York Central Lines, presented a paper before the recent convention of the American Society for Testing Materials, which included a complete discussion of ductility in rail steel. This paper is reprinted on page 289 of the issue of August 11.

Letters to the Editor.

THE FUNCTION OF THE EXTRA GANG.

HUNTINGTON, IND., July 29, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The editorial on the function of the extra gang, on page 124 of the issue of July 21, appealed to me, as an extra gang can much abuse a piece of work if it is not properly organized.

I had occasion a short time ago to visit an extra gang which was trimming a stretch of stone ballast. A foreman was in charge who had spent about \$200 per mile more for stone ballast work a couple of years ago than other foremen who were doing exactly the same class of work under practically the same conditions. He was starting to trim the stone in a manner which was costly and very slow. He laid a fence board on the berm where the slope of the ballast would catch it, after which he had a few men dig out large sized rocks and lay them down in a neat line. This might be all right for a road which has plenty of money, but for efficiency in track work it is hardly necessary, for the operation of trains over this track would destroy this neat ballast line with less than six months. He also had the entire gang of men engaged in trimming ballast in a very short space.

I promptly reorganized his gang in three parts. Two men were detailed to work ahead of the gang, one on each side of the track, throwing loose stone on the berm up on the ballast shoulder and also keeping the ballast out of the way of the boards which were used to make the ballast line. Thirteen men were started in at a certain point. Four of them were placed on each side of the track to form the shoulder and trim the line of the ballast, while four men worked in the center of the track shoveling the ballast out of the center on to the shoulder. Two and one-half by 6 by 16-ft. fence boards were placed on the berm at the points indicated by the ballast templet which was handled by one man a short distance in advance of the rest of the gang.

Thirteen more men were then started in at another point approximately as far in advance of point A as the day's work would carry a gang of 13 men. This gang of 13 men was also supplied with four trimming boards and one templet. The foreman took charge of one gang, while the other gang was placed in charge of the assistant foreman. Six foreigners in charge of a native laborer trucked ballast to points where a full shoulder had not been made. There was also one man carrying water, making a total of 37 men and the foreman. After working a few hours in this manner the foreman voluntarily said that the work was going much faster than formerly and his reports since that time have been surprising to me, while at the same time, his work is done very well. By splitting up the gang as outlined we had three bunches of men always trying to catch up with each other, which naturally incited some rivalry between the bunches as well as serving to keep them apart. It did not give them a chance to do as much talking as a crowd of foreigners will do if too many are working together under the supervision of one man.

This instance illustrates the results that can be accomplished not only by supervisors, but also by many division engineers, some of whom depend too much upon their supervisors, and do not get closely enough in contact with the work themselves. In another instance my attention was called to the poor daily rail reports which were received from a rail gang, and I was able to increase the amount of work done by this gang from 50 ft. per man per day to 100 ft. per man per day by going on the ground personally and remedying the difficulty.

A. SWARTZ,

Division Engineer, Erie Railroad.

FORESTRY OPERATIONS ON THE PENNSYLVANIA RAILROAD.

An important work which has not been emphasized in commenting on the forestry work of the Pennsylvania Railroad is the conservative management of its timbered lands. The logging operations which have been conducted by the company's foresters during the last three years over a total area of about 1,200 acres form only one of the means which are being used by the Pennsylvania Railroad in an effort to solve the problem of procuring ties and other timbers. It has used during these three years 2,600,000 board feet of lumber and 15,000 ties produced from woodlands which are being managed by its foresters. The tracts on which they are applying the principles of silviculture include small areas along the right-of-way which have no value to the company except from the timber which is growing on them, and the more extensive areas of land which are the catchment basins for the mountain reservoirs which supply water for locomotive and shop use.

Logging operations as carried on by the foresters have in view the best utilization of the standing timber and the conservation of the supply for future operations. Although the aim is to leave each tract logged in more productive condition than before, each case presents its own peculiar conditions, and must be con-



Planting Acorns at Morrisville Nursery.

sidered as a separate problem. On many unmanaged timber tracts frequent fires have added to the injury caused by partial cuttings. In extreme cases the result of such fires and cuttings is that there are no young trees which are worth leaving and the mature trees are badly damaged. Under such extreme conditions the area as a rule would be cut clean and a complete planting made. The other extreme condition exists when the area has been free from fires and cuttings and the growth is so well graded in age that it is possible to cut out matured trees and still leave sufficient young growth to stock the area. The most prevalent condition, however, lies between these two extremes, and the methods adopted under such conditions are well illustrated by the work done on the Brush Mountain tract near Altoona, Pa. This tract includes about 700 acres in the drainage basin of the reservoirs which store the water for use in case of fire at the Altoona shops. Forest growth conserves and purifies the ground water supply, and in order properly to care for the timberlands in drainage areas the officers responsible for the water supply were glad to avail themselves of the services of the company's foresters. The tract under management lies in a basin-shaped valley known locally as the "Kettle." The slopes are steep, with a range of about 400 ft. in elevation. The forest on most of the area was second growth in blocks of even age from six to eighty years old, resulting from fires and partial cuttings. There were also some virgin trees which had been left

because they were not merchantable. Three types of timber are distinguishable. The bottom land bears hemlock, white pine, black birch, red maple, white ash, cucumber tree, tulip, basswood and black ash. As this low ground is continually moist, fires have never been able to run over it, and on that account the reproduction is good. The slopes, which include most of the area, have white oak, red oak, scarlet oak, black oak, chestnut oak, chestnut, beech, black birch, white pine, pitch pine, black gum and pignut hickory. Fires have repeatedly run over these



Red Oak Plantation Three Years After Planting.

areas, with the result that there is very little ground cover and reproduction is mostly of sprout origin. The ridges are dry and the scattered timber was stunted and of poor quality. The principal species are chestnut oak, black oak and pitch pine. The reproduction is so poor as to be hardly worth considering. Many trees on the tract had been seriously damaged by fire and wind, and many were dead or dying, so that much of the lumber was fast decreasing in value.

On account of the mutilated condition of this forest a very heavy improvement cutting was necessary. The intention was to remove everything that could possibly be removed without interfering with the water conserving value of the property or reducing the productive capacity of the land, and ultimately to secure a stand which would produce timber usable by the railway. To these ends there were removed in the cutting all mature, damaged and dead trees of all species; all trees of merchantable size, except where needed for reproduction; and every tree of the following species: gum, scarlet oak, birch, sassafras, ironwood, dogwood and witch hazel. The foresters of the company personally marked all trees for removal. In this marking a short-handled axe is used to blaze the trunk breast high and just below stump height. To identify the mark, a sharp blow is struck in the bare spot with the keystone brand of the head of the axe. In the process of marking, many barren spots were found which had been so badly burned that there could be little or no natural reproduction of desirable species. On these areas it was decided to plant three-year-old Scotch pine seedlings where the soil is not too rocky and to sow white pine where there is not sufficient soil for the Scotch pine. A contract was let to an experienced woodsman for all logging on the tract, the contractor agreeing to deliver the manufactured timber on cars at Altoona. This contract also covered taking tanbark and the other by-products, except charcoal, which was covered under a separate contract. The tanbark was taken first, the work beginning early in the spring. Only hemlock and chestnut oaks were usable as tanbark, and the trees which were cut for their bark were allowed to remain where they fell until the beginning of the logging. For getting out the sawed timber, a portable sawmill having a capacity of about 5,000 board feet a day was used by the contractor. The foresters in charge of the work at first designated to the contractor what form of timber should be

made from logs of a given species and size, but as the contractor had had considerable experience in this work and was intelligently interested in this conservative logging, the matter was left largely to his judgment with frequent checks by the foresters. The contractor was so well satisfied with the results of the marking that he has since sought to employ the company's foresters to mark trees on his own land. In general, ties were made from white oak and chestnut oak trees of a diameter which would just make one tie, as it was more profitable to saw logs large enough to make two ties into bridge timbers, crossing planks or smaller sticks. The contractor was required to avoid injury to young trees throughout the work by so felling trees as not to strike any trees not intended for removal, by not cutting saplings of desirable species for use in logging operations, and by not locating roads through young growth. All stumps were cut low, the rule being that the stump of a sound tree should not exceed in height half the diameter of the tree at stump height. The surface of the stumps was left smooth and in good condition so that desirable sprouts would be more readily produced. Branch wood and refuse was cut so as to lie close to the ground and thus rot more rapidly. Since cordwood was not readily saleable in the vicinity, it was necessary to make charcoal from the unmerchantable timber.

Both the contractor for the logging and the one for making the charcoal agreed to exercise every possible care in preventing fires and in fighting them when once started. This is the most important provision that can be made in managing timber land. During dry weather a man was kept patrolling the tract continually, and in case of an alarm of fire the contractor was required to set every man in his force to fighting the fire.

Up to the present time about 1,200,000 board feet of lumber, 5,000 cords of charcoal woods, 90 cords of paper wood, 130 cords of tanbark and 189,000 lath have been made from this tract. Of



Locust Grove Planted in 1902.

this amount the following was taken by the Pennsylvania Railroad:

Lumber—		
Oak	110,000	board ft.
Pine	124,000	" "
Hemlock	71,000	" "
Chestnut	3,000	" "
Crossing plank—		
Oak	33,000	" "
Chestnut	6,000	" "
Ties—		
Cross	678	
Switch	70,000	board ft.
Bridge	57,000	" "
Fence posts	2,971	pieces
Charcoal	153,404	bushels

The products that could not be used by the railway were sold to outside parties. All products taken by the company are charged at market prices, and on this basis the operations on this tract have netted a profit of over \$12,000 to date, including in the expenses all supervision and technical administration of the work.

The cost of practicing forestry in this manner is calculated by

the department at about five cents for each thousand board feet. Since the net profit on the 1,200 acres logged has averaged about \$23 per acre (stumpage not charged), and this is typical second growth land which has been considered of little value, it is evident that if the example of conservative logging set by the railway were followed by other land owners in the state the amount and value of forest products, both present and future, would be greatly increased.

The company's purchasing agent always gives the forestry department a chance to fill a requisition for lumber before an attempt is made to buy it elsewhere. If any of the material needed can be supplied from the company's tracts the order for it is placed with the forester. In order to provide seedlings for planting the company conducts a nursery at Morrisville, Pa., where commercial trees are grown and ornamental stock is carried for use on the system. The total area under cultivation is 38½ acres and the annual capacity is about one million trees. Comparing the cost of producing the trees at this nursery with the market price, the net saving to the company for the year 1910 was about \$6,000. The planting of trees on unused land has been carried on since 1902. During the nine years up to and including 1910, there were set out 4,099,524 trees. This planting has been done on tracts of various sizes and under various conditions. Whenever a tract is turned over for forestry purposes a careful



Locust Plantation Near Vineyard, Pa.

examination is made to determine how it can best be used. If it is already wooded the timber is inspected, and if the stand is sufficiently valuable the tract is carefully logged and conservatively managed. If it must be cut clean, or if it is already a clear area, the advisability of planting it is considered. If it is to be planted, the species which will grow best in that soil must also be decided on. The planting may be done either in the spring or fall, preferably in the spring. This work is done by squads of men who are employed locally. They work over the ground in two rows, the men in front cutting the sod and digging holes with mattocks, and the men behind, who carry the seedlings in buckets partly filled with water, planting them in the holes. The trees are set in rows, the location of each tree being determined by the planters by sighting stakes or by following stretched lines. Under favorable circumstances a squad should plant 400 trees per man per day. To grow tall and straight trees desirable for timber it is necessary that the seedlings be planted close together, the approved spacing in most cases being six feet in both directions. After several years this growth may require thinning if the stand is good, although the natural suppression of a considerable number of the seedlings must be expected. Along all such plantations which adjoin the right of way a fire line is kept plowed to guard against the spread of fire from locomotive sparks. Most of the older plantations are of black locust, and it is to be regretted that this species is being attacked by borers with considerable damage to the young trees. The

borers attack both good and bad trees, and, although they do not kill the trees, the holes they make cause many of the trees to break and to a marked degree weaken the timber which can be made from the tree. The locust leaf miner is also attacking these plantations, with the result that the growth of the trees is retarded through lack of nourishment, since the leaves cannot perform their functions after they are attacked by the miner. Although the locust grows well in Pennsylvania and makes desirable trees, posts, etc., it does not seem practicable to continue its planting for these purposes until some method can be devised to prevent the damage by these insects.

Various lines of experimental planting are attempted from time to time. As an example of this class of work, two double rows of evergreen trees were planted near Glen Loch, Pa., in 1910, to serve as a snow fence. The wooden snow fences commonly used require considerable maintenance, and it is thought desirable to substitute growing evergreen trees where conditions are favorable. Their use, however, requires a wide space between the track and right of way line. In the planting made, the first row of trees is Scotch pine planted 100 ft. from the track, while the outer row, of Norway spruce, is planted along the property line. To save expense, small trees were used in this planting, but it is thought they will be large enough in a few years to drop the snow behind them successfully.

In addition to the other activities of the foresters, the two wood preserving plants operated by the company are also under their technical direction.

The forestry department is in charge of E. A. Sterling, forester, who has several trained men under his direction. William Springer, Jr., is in charge of the logging operations and the management of the woodlots, and W. C. Shepard has charge of the nursery and planting work. John Foley, first assistant forester, who is now acting as chief lumber inspector, was active in the examination of timber land and the inauguration of the conservative lumbering operations. In addition to the regular staff several students in university forestry courses are employed during the summer to handle minor details of the work requiring some technical training. We are indebted to Messrs. Sterling and Springer for the above information.

EXPERIMENTS WITH RED BEECH RAILWAY TIES.

Since 1896 experiments with red beech for railway ties have been made in the neighborhood of Eberswalde by the Prussian Ministry of Agriculture and Forestry, in connection with the Ministry of Public Works. The carrying out of these experiments was entrusted to the main station of the experimental section of the Forestry Department, in connection with the railway authorities of the Stettin line; and later with the central railway office in Berlin.

As regards the results of these experiments, and the lessons to be learned therefrom, Professor Dr. Schwappach has published a report, a concise *résumé* of which is here given.

(1) Sound soft-hearted beech wood, impregnated with tar oil containing creosote, is a very desirable material for railway ties; and on main lines should last at least 25 years.

(2) Sound red-hearted beech wood may be used for ties without any apprehension, if the area of the red heart does not amount to more than 25 per cent for the entire cross-section of the tie, and the heart of the log does not come near the outside of the tie. Ties with gray-dyed heart are to be rejected.

(3) In selecting the wood by the forestry officials, care is to be taken that only sound wood is chosen for ties; rotten places, and especially at large branches, are to be avoided.

(4) Especial attention must be given to thorough drying of the wood before impregnation.

(5) In order to prevent splitting of the wood, the proper precautions must be taken at once after felling the tree. Letting the felled logs lie long in the sun in the early spring, which is often very dry, is especially to be avoided.

BRIDGE KINK COMPETITION

FIRST PRIZE: GALLOWS FRAMES FOR PLACING GIRDERS.

BY S. C. TANNER,

Master Carpenter, Baltimore & Ohio, Baltimore, Md.

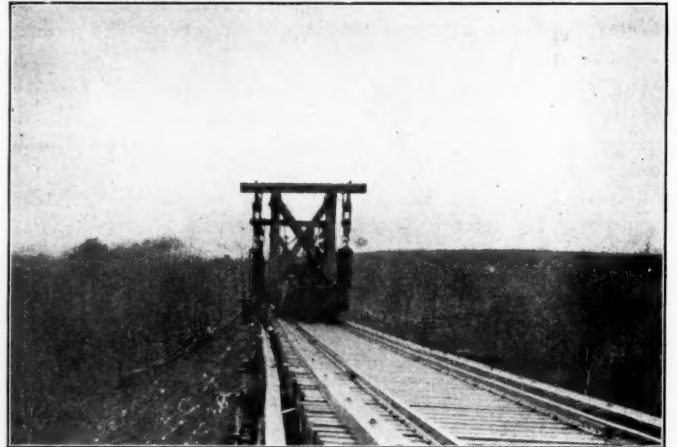
It became necessary last year to replace an old wooden truss bridge with deck plate girders 86 ft. long and weighing approximately 102,000 lbs. The length of the bridge and trestle approaches over all was 731 ft. 5 in., while the height from the base of rail to low water at the location of the girder span was 75 ft. 3 in. The construction of the old trusses was such that it would have been both difficult and expensive to build a gallows frame on the bridge to handle the girders, while the amount of traffic over this branch line did not permit the use of steam



Gallows Frames Partially Dismantled.

wrecking cranes. It would also have been dangerous to snub the girders down into place on each side of the track from a flat car. For these reasons it was decided to build two gallows frames on flat cars, with another flat car, or idler, between. On this idler two transfer bridge winches were installed for hoisting the girders, while four boat cleats were securely fastened to the floor of each of the cars equipped with gallows frames. The girders were unloaded on cribbing on the ground at one end of the bridge on opposite sides of the track the day before they were installed. The following day the three cars were placed between the girders, which were picked up by means of two sets of $1\frac{1}{4}$ in. block and tackle at each end of each girder. The rope was made fast to the boat cleats and the three cars were then pulled out over the location of the girders on the bridge.

After cutting the engine loose and blocking the cars, the girders were lowered into place with little difficulty, notwithstanding



Carrying Girders Out on the Bridge.

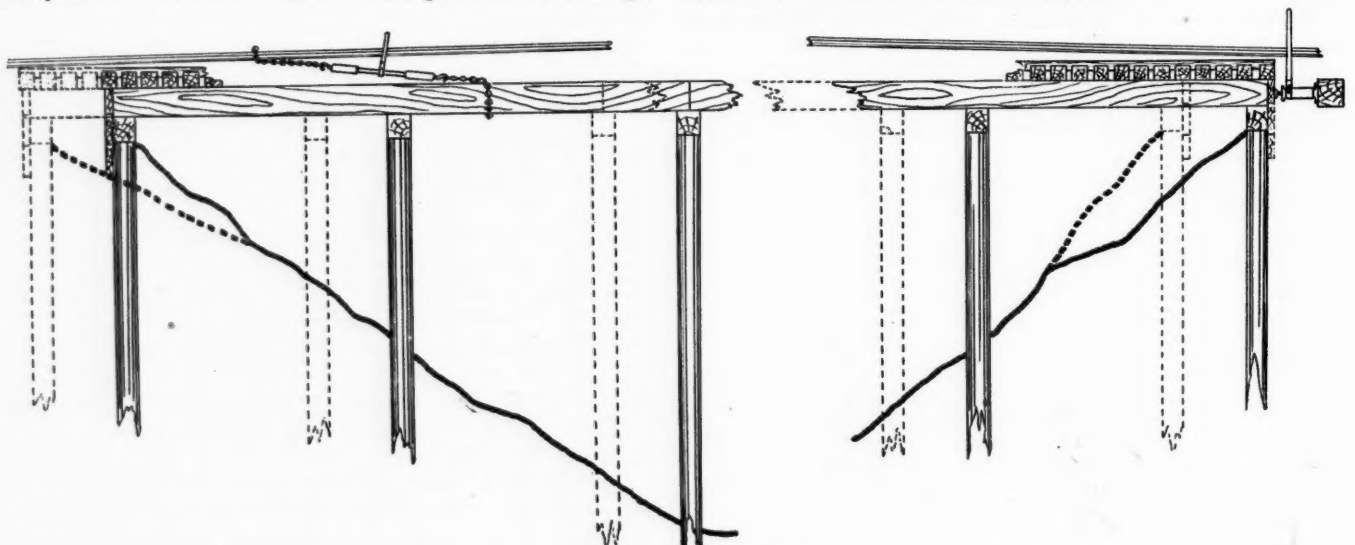
the fact that it rained the entire day and all the ropes were wet and hard to handle.

This method will work out safely and economically on any



Girders Lowered into Place.

single track railway where steam cranes are not advisable or permissible on account of their weight.



Shifting a Trestle Deck.

SECOND PRIZE: SHIFTING A TRESTLE DECK.

BY J. T. FRAME,

Engineer Maintenance of Way, Chicago Great Western, Clarion, Iowa.

It frequently happens that the deck of a timber trestle outlines the piles and by redriving the bridge with new bents complete, several years' service is obtained from the old deck. The standard span length of the old and new trestles being the same, the new bents are driven a few feet distant from the old, and are capped and braced. The process of changing the deck from the old to the new location, if dismantled and moved in sections, is tedious and expensive. Considerable time and expense as well as delays to trains is saved by jacking up the rails, leaving the stringers, ties and guard rails intact, pulling the cap drift bolts and moving the deck forward. A jack block is set in the embankment at the end from which the deck is to be moved, and a heavy ratchet jack is set against the end of each chord of stringers with this block as a base. A steamboat pulling jack is anchored to each rail and to the other end of each of the chords. A man on each of the four jacks will move the entire deck of a trestle of several spans in length to its new location in a few minutes. The attached sketch [see preceding page] shows the manner in which the work is performed.

DERRICK CAR FOR HANDLING BRIDGE TIMBERS.

BY L. C. LAWTON,

Division Engineer, A., T. & S. F., Newton, Kan.

A number of divisions on the Santa Fe use a derrick car quite similar to the one described in the *Railway Age Gazette* of July 21. So much work is done with them that one division at least has two of these cars. As their uses multiplied it was found that piles or rail could not be unloaded from a gondola car on account of the boom striking the end of the car while coupled with the derrick. The original seat of the boom was placed at the bottom of the mast, and this is still used for heavy lifting from flat cars. To make it possible to lift from the center of coal cars a second seat for the boom was placed 3 ft. above the first on the mast. This is used almost entirely in unloading bridge material, making it possible to pick up any standard stick without lengthening the boom.

RAILS AS BRIDGE STRINGERS.

BY E. R. LEWIS,

Division Engineer, Michigan Central, Bay City, Mich.

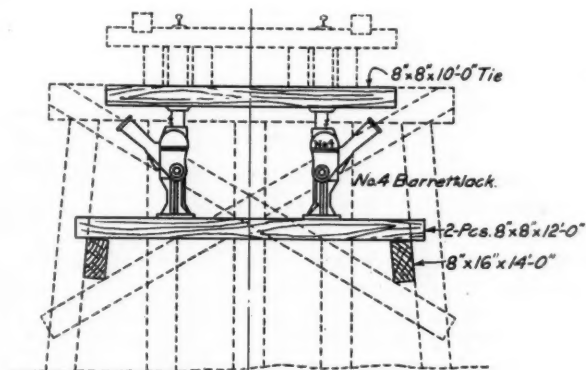
It was necessary several years ago to lay track over seven waterways for which wooden trestle bridges with spans 16 ft. long were designed. The materials for these trestles came to hand promptly excepting the 7 in. x 16 in. x 32 ft. Douglas fir stringers, which were ordered from the Northwest and had been delayed in transit because of a wreck. To allow the track laying to proceed continuous girders were designed and made from 65 lb. rails and used in place of the stringers. The spans were reduced from 16 ft. to 8 ft. and piling driven accordingly. The elevation of the cut-off was raised 11½ in. to provide for the difference in depth of stringers. The girders were made of nine rails each, balled together, five rails standing upright side by side with four on top of them upside down. Steel strap clamps held the rails in position while holes were drilled through the webs and 1 in. stringer bolts securely bolted through all the rails. The drilling and assembling were done at the bridge sites by the blacksmith and helpers. These girders were laid on the wooden caps and fastened to them with drift bolts and clamps to prevent creeping. While the construction was intended to be temporary, the girders have been in place to this time and have given satisfaction.

METHOD OF RAISING TRESTLES.

BY M. RINEY,

Foreman of Bridges and Buildings, Chicago & North Western, Baraboo, Wis.

It has recently been necessary to raise several pile bridges from 8 to 28 in. on a branch of the Chicago & North Western, where there were four passenger and six freight trains daily between 7 a. m. and 6 p. m. Second-hand 8 in. x 16 in. timbers were placed longitudinally on the pile, bracing the entire length of the bridge, as shown in the sketch. Eight inch x 8 in. x 12 ft. ties were placed on these stringers, and jacks placed on them, while 8 in. x 8 in. x 10 ft. ties were placed on the head of the



Raising Trestle with Jacks.

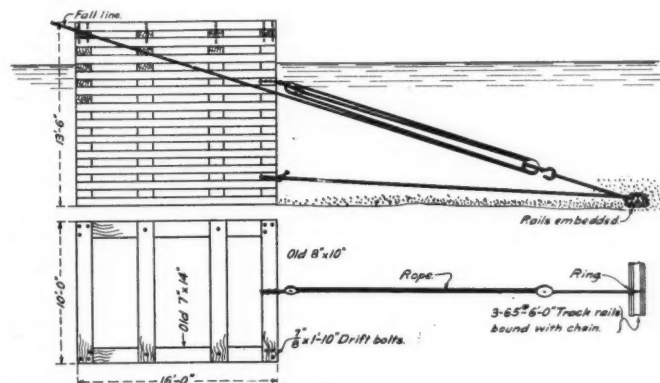
jacks under the track stringers, of which there were three under each rail. The longest bridge raised was a 19-span structure 243 ft. long with an average height of 16 ft. This entire bridge was raised with six No. 4 Barrett jacks and two screw jacks and a safe run-off made in ten hours. Dowels and lining bolts were put in place and all material picked up within this time. It required one day to place the 8 in. x 16 in. timbers the entire length of the bridge, costing \$15.25, while it cost \$13 to raise the bridge. The cost per lineal foot of this work for the 8 in. raise was 11¼ cents, which is as cheap as any way to handle this class of work.

ANCHORING CRIBS IN WASH-OUTS.

BY F. BURRELL,

General Bridge Foreman, Chicago & North Western, Fremont, Neb.

The following scheme was used successfully in filling a wash-out a few years ago at a point where the river had overflowed and washed out a long stretch of track. The stream was moving



Crib and Anchor for Filling Washouts.

with a velocity as high as 12 miles per hour and left a hole from 20 to 30 ft. deep with from 10 to 22 ft. of water. The pile driver was busy at a wreck some miles away, and, in order to reduce the amount of pile driving, it was determined to build cribs out as far as possible.

Cribs of the dimensions shown in the attached drawing were built and an attempt was made to put them into place, but it was found impossible to hold them without anchors. To make these anchors three pieces of 65 lb. rail, 6 ft. long were bound together by chains to which a ring was fastened. The crib was fastened to the anchor by ropes and tackle, as shown. The anchors were worked out to a favorable position and dumped, the velocity of the water, together with the weight of the rail, causing them to become quickly buried in the sand. The cribs were then filled with riprap and sunk into place. In this way the work was carried on until the bridge was shortened to 160 ft. before the pile driver arrived. This method is especially applicable in streams carrying a large amount of sand or silt where the anchor and crib are quickly buried.

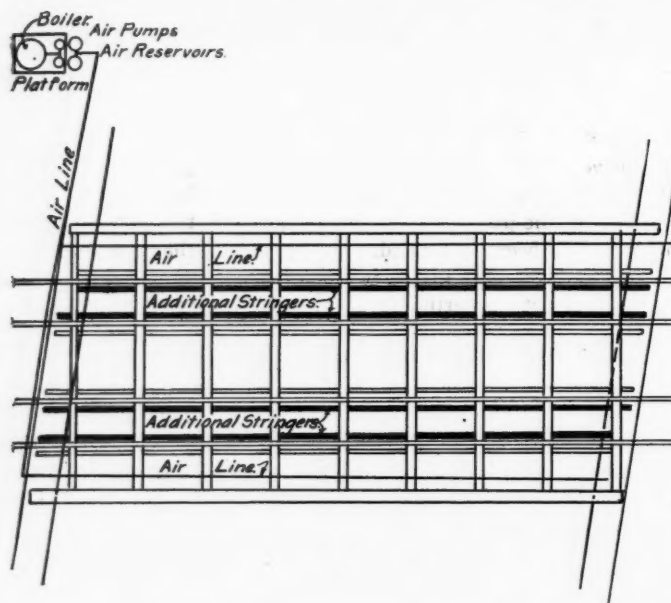
COMPRESSED AIR PLANT.

BY G. LE BOUTILLIER,

Division Engineer, Pennsylvania Lines West, Cincinnati, Ohio.

A home-made field drilling, reaming and riveting plant has been extensively used in the erection and reconstruction of steel bridges with company forces on the Cincinnati division of the Pennsylvania. This plant was built some six years ago, when 18 light bridges were replaced with heavier structures. These bridges ranged in length from 20 to 90 ft., and consisted of deck I-beams, deck plate girders, deck troughs, half through plate girders with trough floors and through plate girders. Considerable field reaming and riveting were necessary on some of these bridges.

Since that time it has been used a large number of times,



Layout of Compressed Air Plant.

both in the erection of new bridges and in strengthening old bridges by adding web stiffener angles, cover plates on girders and floor beams, and adding floor stringers and knee braces. The accompanying sketch shows the arrangement of the plant as used in strengthening bridge No. 220 at Dayton, Ohio, during 1910.

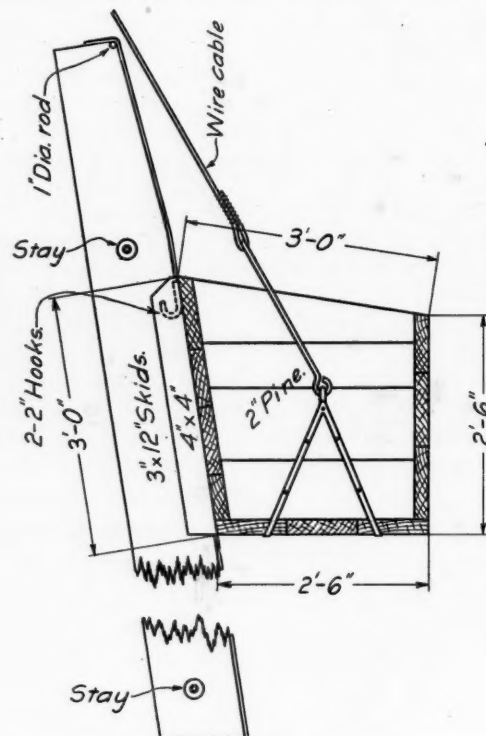
In constructing the air compressing plant an old hoisting engine boiler was set up to furnish the steam. Two old locomotive air pumps provided air pressure, while two old locomotive air tanks were used for air storage. Old gas and water pipes and connections were used to pipe the air to the tools. Drilling, reaming and riveting tools, with the necessary air hose, were purchased at a small cost. The whole plant is set up at each bridge, as required, and has worked most satisfactorily.

A CHEAP CONCRETE HOISTING ELEVATOR.

BY H. C. ARTER,

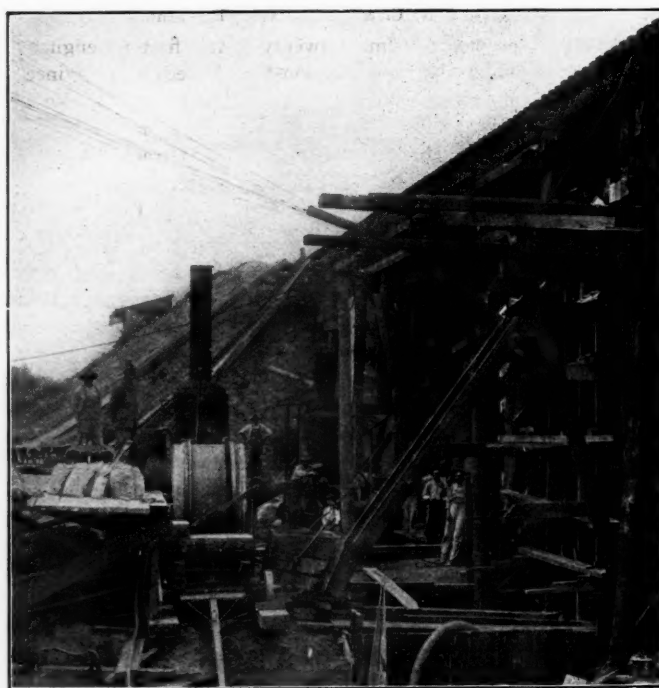
Concrete Foreman, Chicago, Burlington & Quincy, Jacksonville, Ill.

In building concrete piers near Jacksonville, Ill., an apparatus to hoist concrete into the piers was devised to do away with the



Skid and Bucket of Concrete Hoisting Elevator.

common use of false work. A ladder or skid was made out of two pieces of 3 in. x 12 in. timber placed 2 ft. 6 in. apart and long enough to reach from the ground to the top of the piers. A 1 in. rod was placed across the skid at the upper end, as



Concrete Hoisting Bucket.

shown in the sketch. A concrete box of $\frac{1}{2}$ cu. yd. capacity was made of 2 in. pine with 4 in. x 4 in. guides extending down outside the ladder to prevent the box from slipping off the

skids. Two hooks were placed on the under side of the box at the upper edge. A cable was fastened to a hoop on the box and passed through a block to the drum of a hoisting engine. As the box is raised to the top of the skids the hooks engage the



Dumping the Bucket.

1 in. bolt and dump the box. With this arrangement it is easily possible to handle a $\frac{1}{2}$ yd. batch every $1\frac{1}{2}$ minutes. The cost of this device was about \$10, as compared with a probable cost of \$100 for false work.

RENEWING TIES TO FACE.

BY R. P. TRABUE,

Roadmaster, N. C. & St. L., Nashville, Tenn.

After an experience of almost twenty years, first as engineer of construction and then as roadmaster, I became convinced that the prevailing methods of track maintenance left much to be desired in point of economy. Increasing tonnage makes it more and more difficult to maintain a high standard of track under the old method without a very great expense. After a careful consideration of all the phases of labor and material that are employed in the maintenance of track, I came to the conclusion that we could get better track, at much less cost, by renewing ties to face; and, while this method is revolutionary in its nature, the facts, borne out by an experience of two and a half years, have proven that the practice is all and more than I had expected.

Below are comparative figures of actual cost of maintenance of track by putting in ties to face and by the old method of patching in ties. The effective life of a cross-tie in main track, as borne out by our past experience, is six years. The cost of the initial preparation of a mile of track, with ties renewed to face, for which special account was kept, was as follows:

3,000 cross-ties, at 40 cents.....	\$1,200.00
1,263 cu. yds. ballast, at 50 cents.....	631.50
Labor putting in ties, ballasting and dressing up.....	844.00
	<hr/>
	\$2,675.50

Average cost per year, based on six-year life of ties.....	\$446.00
Cost of labor required to keep this mile of track in first-class condition, based on our experience of the past two years and a half, including three winters, has been, for the first three years, \$27.50 per year, and for the ensuing three years will be, say \$75.00 per year, or an average cost per year for six years of.....	\$51.25
Initial cost—average per year.....	<hr/>
	446.00

Total average cost per mile, per year, for renewal of ties and ballast, and labor of keeping track in first-class condition	<hr/>
	\$497.25

If the ties are renewed one at a time at different places,

always leaving sound ties on each side of those advanced in decay, as is the common practice of other roads, it might be possible to get a life in main line of seven years. By this plan it would be necessary to work over the entire mile every year renewing ties, and 429 ties would be required each year which at 40 cents would cost \$171.60. The labor of putting in these ties, tamping up, etc., would cost \$77.22. To keep this track in good condition would require that a slight raise be made and some new ballast added every two years. On stone ballast it is impossible to tamp on a raise of less than an inch and a half, which would take 475 yds. of ballast at 50 cents, amounting to \$237.50, or \$118.75 per year. The cost of labor for such surfacing is \$500 per mile, or \$250 per year. To this must be added the cost of further maintenance which is required on account of the continual disturbance of the roadbed and which, according to our experience, will amount to \$100 per mile.

Summarizing, we have the following cost per mile per year:

Ties	\$171.60
Labor, patching in ties.....	77.22
Ballast, $1\frac{1}{2}$ in. every two years.....	118.75
Labor, surfacing and applying ballast.....	250.00
Labor, maintaining surface and line.....	100.00

Total average cost per mile per year.....	<hr/>
	\$717.57
Average cost per mile, renewing ties to face.....	<hr/>
	497.25

Difference in favor of renewing ties to face..... \$220.32

In both of the above cases it is assumed that a clean bed of ballast exists under the ties. With the first method, at the end of the six-year period the 4 in. of ballast would be in a much better condition than the $4\frac{1}{2}$ in. which has been put in at two-year intervals by the second method. It would not be necessary at the end of the six-year period to use as much as 4 in. of ballast again and a raise of $2\frac{1}{2}$ to 3 in. would be all that would be needed for another six years. The annual cost for the second six-year period would be considerably less than for the first.

Under the old method, floating gangs are necessary to help out the section men in maintaining track. Every year less and less of this labor is necessary, as our track is put up by the new method. This is a great saving, for floating gang labor is expensive as well as unsatisfactory. The adoption of the first method requires a greater initial outlay for a few years and the economy of the plan cannot be fully realized until a large amount of track has been so treated. It may appear that the life of a white oak cross-tie as given above is shorter than past experience would warrant; nevertheless, the figures are correct, and are arrived at from careful observation.

The following objections have been brought against renewing ties to face:

First, that it is wasteful. The figures given disprove this. The value of the ties taken out before this is absolutely necessary is not the only thing to be considered, the cost of labor being the principal item.

Second, that it causes disturbance of roadbed. As 429 ties, or one-seventh of the entire number, have to be renewed every year by the patching method, and the entire mile gone over, raising low places and joints where ties are almost rotted and doing necessary repair work to keep the track in first-class condition, it is very evident that the entire roadbed is very much disturbed every year. Under the other method only one-sixth of your track is renewed each year, and the small amount of repair work done on the part of the roadbed that is not renewed will not appreciably disturb it.

Third, that track becomes weakened just before the time of renewal. This objection is met by the fact that, on renewing ties at the end of a six-year period, ties are taken out which would last one, two, and, a few, three years. These ties are used in sidings, but, in the estimates given, no credit for this has been taken.

Fourth, that the life of the ties to be put in sidings is reduced by rehandling. Doubtless the life of the tie is somewhat lessened by rehandling, but as no account is taken of these ties for sidings in the estimates of cost any use got from them is clear gain.

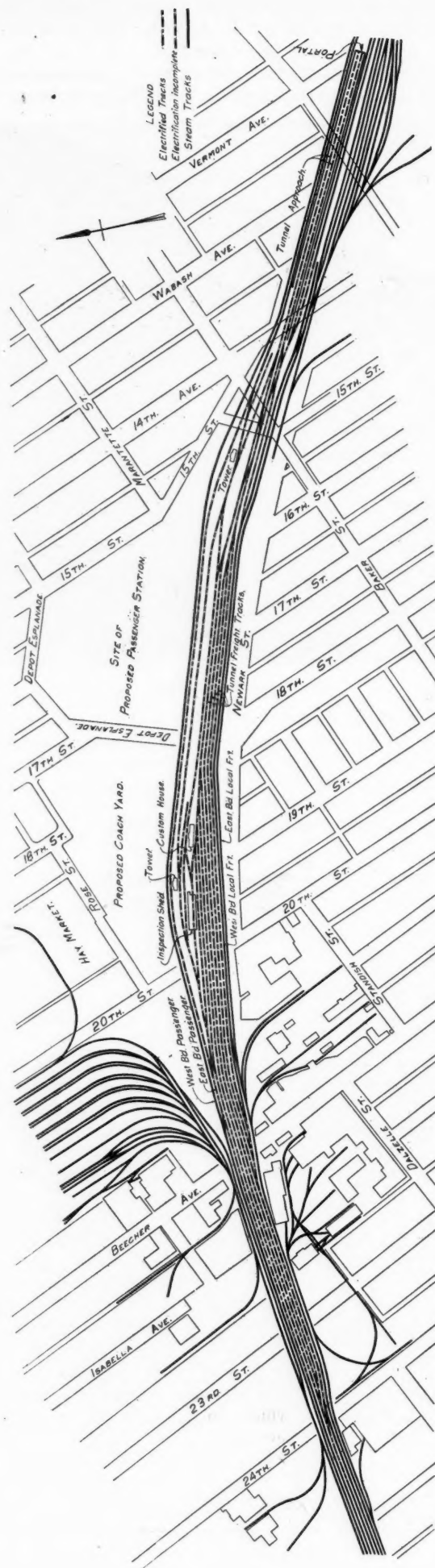
DETROIT RIVER TUNNEL YARDS.

In planning for the operation of the tunnel under the Detroit river connecting Detroit, Mich., and Windsor, Ont., it was necessary for the Michigan Central to provide electrified yards on both sides of the river. It was also desirable to include in the new improvements a classification yard. The single line of the Michigan Central from Buffalo branches at this point into the three lines to Chicago, Toledo and Bay City, making Detroit a natural distributing point. Although a great deal of classification could advantageously have been handled here, it was difficult to do such work before the building of the tunnel, as the existing yards were inadequate and it was necessary to ferry all freight across the river. A little rough classification work was done in loading and unloading the ferries. The old yards on the Detroit side extended east of the tunnel portal so that it was not feasible to attempt to utilize this old yard in planning for a new classification yard. The right of way from the Detroit portal of the tunnel to Bay City Junction, where the line to Bay City diverges, is through the manufacturing district of Detroit, and on this account it was thought best to locate the yard on the Windsor side, where the adjacent property was undeveloped and ample room could be secured for building a yard which would satisfy present needs and allow ample room for future expansion. The complete yard system includes east and westbound hump classification yards, and on the Windsor side east and westbound electrified receiving and departure yards on both the Windsor and Detroit sides.

The electrified section on the Detroit side consists of a westbound receiving yard of three tracks about 2,350 ft. long, a similar eastbound departure yard, a custom house track, an inspection track, one passenger track, and a number of short switching tracks to facilitate handling of the electric locomotives. The layout of these tracks was influenced by the plans now about complete for building a new passenger station between Fifteenth and Seventeenth streets, as shown in the accompanying drawing. The freight yard was located so as not to interfere with the work on this station and to allow ample room for additional passenger tracks through the new train shed. Westbound trains are pulled through the tunnel by electric locomotives which enter the westbound electrified yard by a direct lead from the westbound tunnel track. The trains are dropped in this yard and picked up again by road engines which pull through to the west end and reach the main line by a single track lead. Eastbound tunnel freight is separated from local freight at West Detroit and is pulled into the eastbound electric yard by road engines. It is picked up here by electric locomotives and handled through the tunnel to the electric receiving yard on the Windsor side. Two electric locomotives are used on all freight trains, their capacity being such that two of them can handle the same tonnage as one road engine. There is an additional object in using two, since by placing one on the front and one on the rear end of every train the possibility of a train breaking in two in the tunnel is eliminated.

The custom house track is entered from the westbound receiving yard and a house is provided for the American customs officials. The electric locomotives are housed and repaired in a repair shed on the repair track, having a capacity for three of the locomotives at one time. Movements into and out of the yards are controlled by two all-electric interlocking plants, one of which also controls eastbound movements into the tunnel.

On the Windsor side it was necessary to build a new passenger station, as the old one was located on the river front. The town of Windsor lies along the river and in locating the new station it was desirable to bring it as near the river as possible. The approach grade to the tunnel, however, begins more than a mile back from the river, and the station had to be located just beyond this point on the level grade. A brick and stone building has been provided with facilities for handling the passenger business for a considerable time in the future.

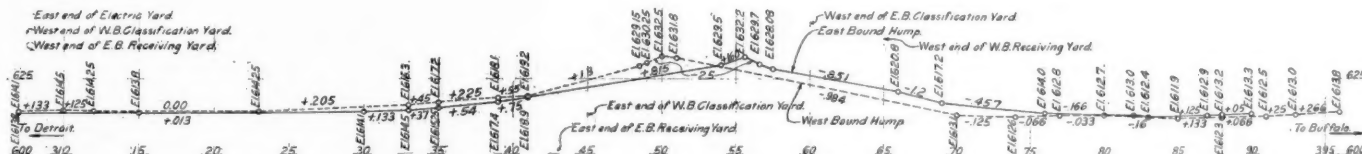


Michigan Central Yard on Detroit Side of River.

The electric yard begins a short distance east of the station and is entered by a double track lead from the main tracks. It also has connections with inspection and switching tracks alongside the main line. A small inspection shed is provided at this point for minor repairs to the electric locomotives, which must be made on the Windsor side. The electric yard has eight tracks, each about 3,000 ft. long, the leads being arranged so that four of the tracks are operated as eastbound and four westbound. The track centers are 15 ft. between adjacent tracks in each set

to two tracks about 1,600 ft. long) and five tracks about 4,000 ft. long. All of these seven tracks converge to a single lead to the main track.

The entrance to the westbound receiving yard is at the same point as the junction of the eastbound classification yard with the main. A single lead to this receiving yard diverges at once to five tracks about 3,600 ft. long. A 20-stall brick and frame engine house, a hemispherical bottom steel water tank, a concrete cinder pit, an oil house and other accessory buildings are provided



Profile of Humps; Windsor Yard.

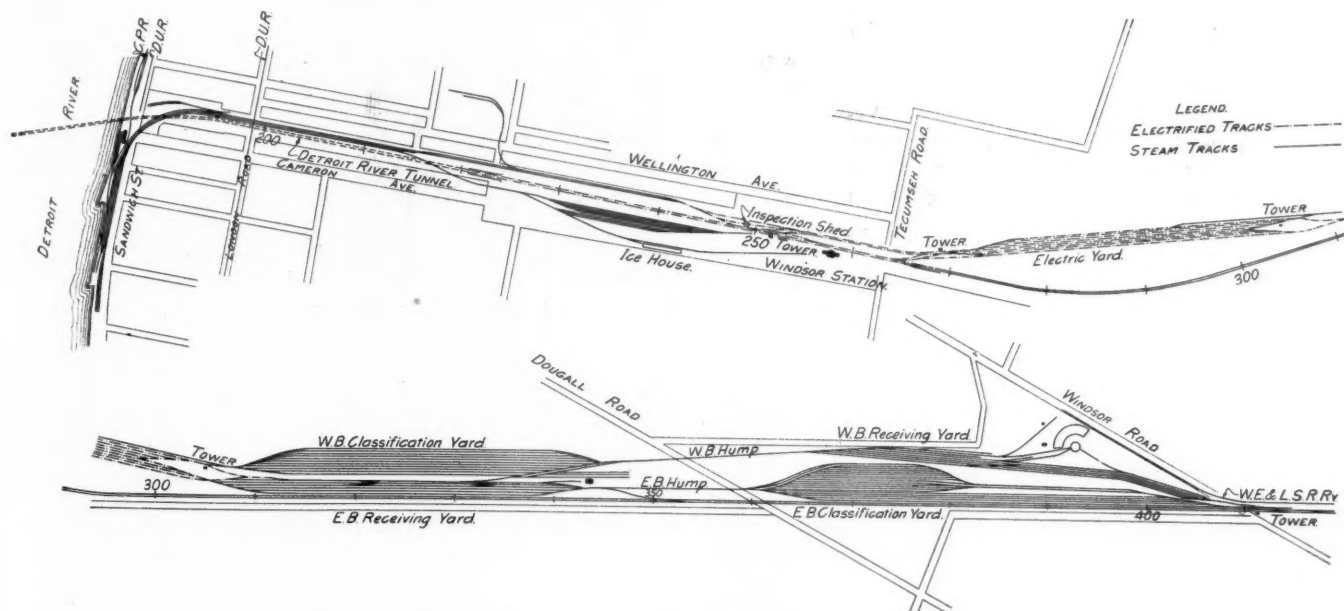
of four, and 19 ft. 6 in. between the two sections, allowing room for a row of electric arc light poles down the center of the yard. The yard is laid with 80-lb. relaid rail on creosoted ties. Manganese frogs are used throughout. This yard serves the same purpose and is operated in the same manner as the one already described on the Detroit side, except that the steam locomotives operating into and out of these yards are the shifting engines from the hump classification yards. An all-electric interlocking plant governs the entrance of the yard at the west end and a mechanical plant governs the connection between the electric and the steam yards.

The eastbound steam receiving yard connects directly with the eastbound electric yard and has six tracks about 3,100 ft. long. A Canadian customs house is provided in connection with this yard for an inspection of cars by the Canadian government.

at this point, reached by engine leads from this receiving yard. As there were no accommodations for train men within convenient reach of this point the company has provided a house where the men can secure rooms and meals.

The crossings of the two humps and the main line over the highway are carried on plate girder structures raised on concrete abutments. It was necessary to revise the main line grade to provide the necessary clearance over this road. The highway which crossed the side near the east end of the eastbound classification yard was closed and in return for this concession the company built and maintains a highway parallel to its tracks on the north side of the westbound receiving yard to a junction with Dougall road, which crosses under the humps.

The westbound classification yard consists of 12 tracks averaging about 3,100 ft. long, entered from a single ladder off the



Classification and Electric Yards on Windsor Side of River.

A connection is provided from the east end of this yard to the main tracks to allow any trains which do not have to be classified to take the main line again without going over the hump. A long lead over the hump was required on account of the location of a public highway which could not be closed and which had to be crossed at an elevation which would provide ample clearance. The grades over both humps are shown in the accompanying profile.

Two ladders lead off of the hump to 13 tracks, averaging about 1,800 ft. long (which converge through a double ladder

hump. In order to provide somewhat longer tracks in this classification yard double turnouts from the ladder at the west end were installed.

The capacities of these yards are about as follows:

Westbound receiving	450 cars
Westbound classification	930 "
Eastbound receiving	465 "
Eastbound classification	1,085 "
Eastbound electric	280 "
Westbound electric	280 "

Total 3,490 "

Under normal operating conditions this yard is handling about 1,150 cars a day, including both east and westbound. The cost for classification, exclusive of engine charges, is about 10 cents per car.

The site of the yard before work was begun was a low, flat area, and exclusive of the humps, the building of the yard did not require a fill more than two or three feet high on the average. The construction up to subgrade was handled by contract, the filling material being partly tunnel mud and excavation from the approach cut on the Windsor side and partly gravel, hauled from a point about 32 miles east. In the latter case the gravel was hauled in trains of standard flat cars, and the raising of the yard was accomplished by spreading from alternate tracks. Under the most favorable conditions the cost of placing this gravel under the track did not exceed 20 cents a yard.

The engineering features of the tunnel were described in the *Railway Age Gazette* of April 29, 1910. The tunnel has now been in satisfactory operation for several months and its maintenance has proved to be simple. A gang of a foreman and four men are able to take care of all necessary maintenance work in the tunnel and the approaches on both sides. A track walker covers the entire length of both bores four times in each twenty-four hours. The maintenance of the new yard is also very easy on account of the high class of its construction. A foreman with twelve men cares for the entire mileage of steam and electric yards on the Windsor side.

The improvement work around Detroit was handled under the direction of G. H. Webb, chief engineer; R. D. Starbuck, assistant chief engineer; and F. B. Marble, division engineer of the Michigan Central, to whom we are indebted for the above information.

SECTION FOREMEN MEETING ON THE ST. PAUL.

A society named the Section Foremen's Debating Society has been maintained on the C. & C. B. division in Illinois of the Chicago, Milwaukee & St. Paul for the past 15 years. This organization has a president, vice-president, secretary and treasurer, and is conducted the same as any other society. There is very little expense connected with it, except the hall rent and a small salary for the secretary, which are met by a membership fee of one dollar. All section foremen on the division are eligible for membership. The meetings are usually held on Sunday at the roadmaster's headquarters, so that they do not in any way affect the supervision of the track. At first, meetings were held every month, but after a few years they were reduced to one every two months, and now they are held four times a year—in March, June, September and December. It has been found that all the topics can be discussed sufficiently in these four meetings. In March the spring track work is the subject; in June, the general cleaning up work; in September, the fall work, and in December, the care of the track during the winter. A regular set of topics, usually about 10, is prepared by a committee of three or four foremen and sent to other foremen for answers. These papers are brought up at the meeting one at a time, and are followed by free discussion. If a majority of the members approve them the questions and answers stand. If not approved, new answers and amendments are attached, all of which are recorded for future reference.

These meetings have been found to be especially beneficial to the young foremen just starting in the work, as they have the opportunity to pick up a great many points from the discussions of the track problems by the older men; but they are of much value to all. It has been found that they also result in a greater uniformity in the work. The advantages derived are such that even if the meetings were held on week days it is considered that these benefits would more than offset the time lost. The meetings provide a good opportunity for the roadmaster to bring up general subjects before his men in a body and explain to them the details. For instance, just before the last spring meeting it

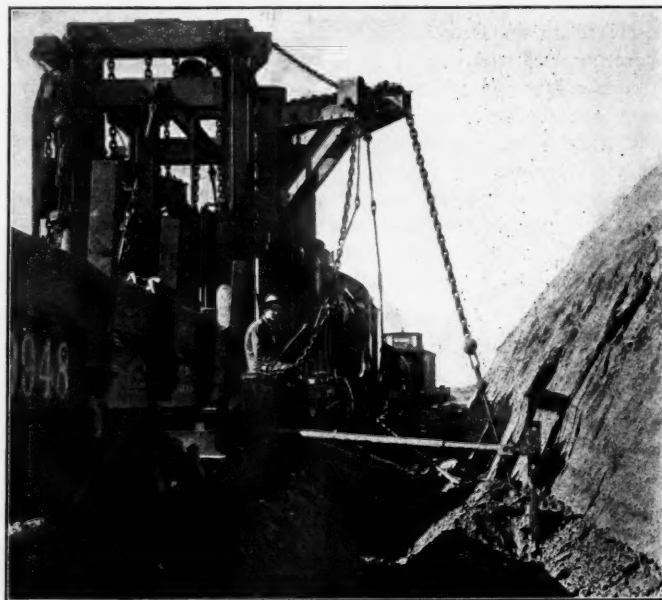
became necessary to reduce forces. At this meeting the roadmaster explained the situation to the men and talked the matter over with them in a short time, which he could only have done otherwise by visiting each one personally on the track and spending two or three days. Such matters can be handled much more quickly and far more satisfactorily than is possible by letter. The meetings have been held so long that the men think they cannot get along without them. They were started under the direction of Edward Laas, at that time roadmaster, and have been continued under the supervision of W. H. Kofmehl, who succeeded Mr. Laas, and to whom we are indebted for this information.

DITCHING WITH THE BOWMAN DITCHER.

BY T. AHERN,

Superintendent, Coast Division, Southern Pacific.

The coast line of the Southern Pacific traverses territory between Surf, Cal., and Santa Barbara in which there are a large number of deep cuts through material that erodes very easily when subject to wash. As a result of the heavy rains of the winter season bring down large quantities of material



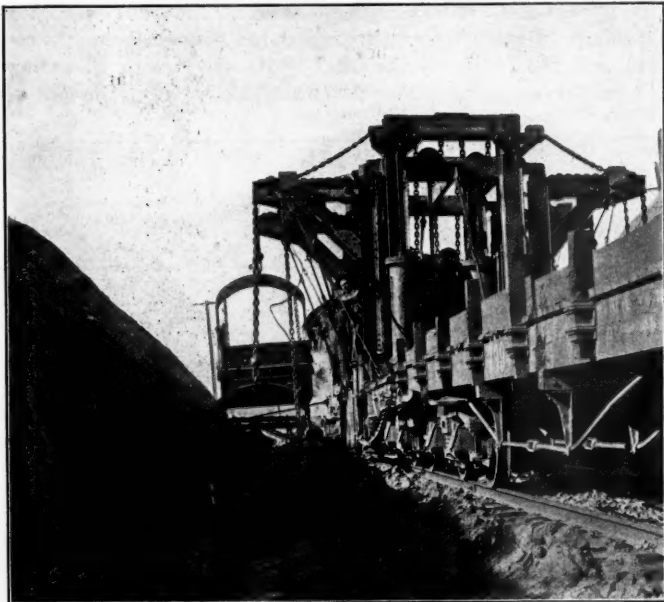
Bowman Ditcher Plowing Ditch.

which entirely fills the ditches and runs over the track, frequently causing delays to traffic.

It being a frequent occurrence for an entire summer's work of cleaning out and reshaping the ditches and cuts to be entirely swept away by one storm, the problem of taking care of the ditching work on this portion of the line was too great to be handled by the use of the ordinary maintenance equipment, and it was necessary to put in service a type of ditching machine that would cope with the situation. A machine consisting essentially of a steel frame flat car surmounted by the various appurtenances constituting a complete ditching apparatus was constructed in the Sacramento shops of the Southern Pacific from plans furnished by the designer, Ben Bowman, of Springfield, Mo. This machine has been in operation in the above mentioned territory of the Coast division for the past eighteen months.

At one end are located four No. 5 New York air pumps, operated by steam supplied by the work train locomotive, and two large drums for the storage of compressed air. Midway of the car are situated two sets of steel standards from which swing four steel booms. Massed in between the standards are four hoisting cylinders 24 in. inside by 5 ft. long and four dump cylinders 12 in. inside and 5 ft. long.

Threaded through a block attached to the plunger of each cylinder is a chain, which passes out and swings from the end of each boom to which is attached, at various times, the buckets and other devices used in the process of operation.



Loading Material into Buckets.

Just forward of the pumps and drums is the stand of the operator who by means of 18 valves controls every movement of the machine by the application or releasing of air pressure. The machine complete with all the attachments weighs 58 tons.

The first step in ditching with the "Bowman" consists of the plowing and breaking up of the material removed. The



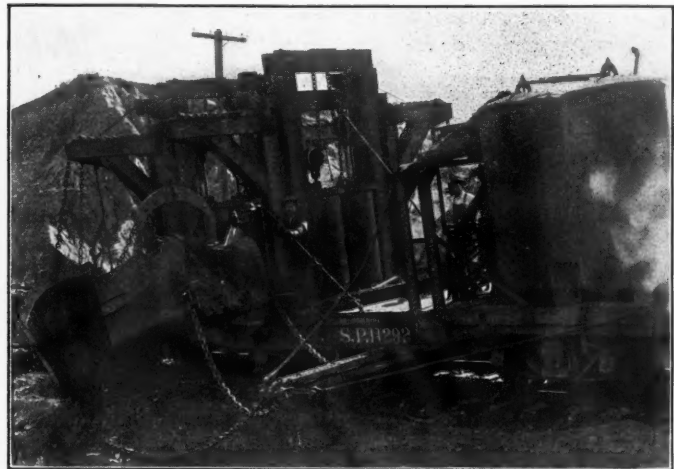
Hauling Material Out of Cut.

plow is attached to the telescoping iron poles, as shown in Fig. 1, set at the angle and depth required and pulled through the entire length of the cut a sufficient number of times to thoroughly break the soil. The operator has absolute control of the plow, and can at will, raise, lower, tilt, or move it laterally. After each side has been thoroughly broken up, the plow is removed and the buckets attached, as shown in Fig. 2, using two or four buckets as desired. The buckets are of four yards' capacity each, are similar in construction to an ordinary scraper, and are filled by dragging. If four buckets are used, the two lead buckets are lowered and filled first, and after being raised to clear, the rear buckets are lowered and filled. When all four buckets are filled they are raised to

clear, and then the run is made to the dumping ground. Photographs 3 and 4 shows the ditcher running to unload and the details of unloading.

Fig. 5 illustrates the sloper in operation trimming the cut to a uniform slope. Following this the buckets are again attached and run through to gather up the dirt trimmed off. Fig. 6 illustrates the spreader attachment in the act of leveling off the fill. Fig. 7 shows the ditcher after a day's work ready to tie up for the night, while Fig. 8 is a view of a completed ditch after being touched up by section men and the burlap protecting the ballast removed. Experiments with a burlap blanket spread over the ballast have proved quite successful. It keeps the same clean and consequently reduces the cost of forking ballast.

The limit of reach of the "Bowman" is 15 ft. from the



Dumping the Buckets.

center of the track. The ditching illustrated in the accompanying photographs resulted in a 26 ft. roadbed. The machine is capable of handling any class of material; dry earth, mud or any rock that can be shattered by powder. Not only can it be used for ditching but also the excavation for line changes of a small magnitude can easily and cheaply be accomplished by gradually shifting the track over.

It has been found a difficult matter to establish a reliable



Plowing Down the Slopes.

cost unit on account of the wide variations in the class of work performed and the ever changing conditions met. The following statement gives the average costs per month for eighteen months ending April 1, 1911. During this period it is believed that every climatic and physical condition, in-

cluding the maximum and minimum hauls and the most widely varying yardage per lineal foot of ditch.

AVERAGE COSTS PER MONTH FOR 18 MONTHS.

Wages of ditcher crew, 1 engineer at \$125.00 per month, 4 bucketmen at \$2.25 per day.....	\$371.93
Wages of work train crew, 1 engine crew, conductor and 2 brakemen	564.33
Ditcher supplies, including minor repairs, bolts, cables, lubricating oil, waste, etc.....	80.82
Work train supplies, including fuel oil used by locomotive for its own steam and operating of ditcher, waste, lubricating oil, etc.....	293.97
Miscellaneous work, including heaping ballast ahead of ditcher, forking ballast, trimming ditch and cut, leveling fills, and restoring shoulder.....	463.75

Total average\$1,774.80

Average yards moved 8,719.5

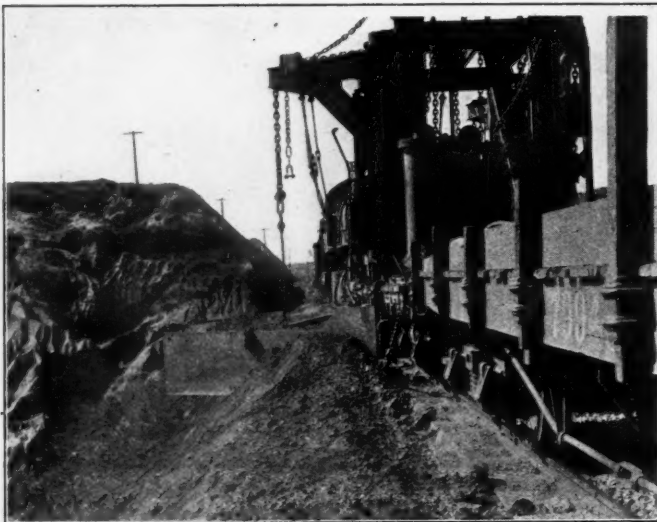
Average cost per yard exclusive of miscellaneous work.....\$0.15

Average cost per yard inclusive of miscellaneous work. 0.2035

Average ditch, .6 yard per lineal foot..... 0.1221

All minor repairs included in this item were made while the machine was in the clear for the passing of trains or while the locomotive ran for water.

A comparative statement showing the cost month by month of operating the ditcher and work train indicates fair uni-



Spreading Material Down the Bank.

formity, while the yardage moved and lineal feet of ditching accomplished varies considerably owing to the different classes of material handled and to the time involved in getting it into movable shape, the distance hauled, the time lost



Bowman Ditcher Packed Up Ready for Travel.

in going into the clear for traffic, which varies with the distance to available siding, and the miscellaneous work made necessary by the ditcher.

In considering the miscellaneous work, it is hard to draw a

line between what is justly chargeable to ditching and what is chargeable to track maintenance. Before the ditcher starts its operation the ballast on the fill where the ditcher is to dump must be cast to the center of the track. After the machine has completed its work, the cut and fill are gone over by an extra gang, which forks and dresses the ballast to standard, trims the cut and restores the shoulder to both cut and fill, produces the ditch from the mouth of the cut down the slope to carry the water away from the fill, re-



Section of Completed Ditch and Track.

stores the cattle-guards which it may have been necessary to remove, and this leaves the section worked in standard condition.

This work may not be done during the same month as the ditching, and, therefore, the cost per yard of material moved is less than in the months when the extra gang charges are included. The cost per yard during the period of eighteen months ranges from 0.08 to 0.45, and the yardage moved ranged from 22,000 to 4,400. The number of trips ranged from 25 to 75 per day.

PROTECTING PILES FROM ROTTING.

It is well known that wooden piling is especially liable to rot in such places as are subject to the alternate action of moisture and dryness; for instance, just where they are driven into the earth. Knapen, who bases his suggestion on repeated experiments and researches in connection with the decomposition of wood, proposes a method of avoiding this alternate action of the temperature by preventing the deposit of moisture at the place where it is most hurtful. His system consists essentially in the use of a protecting mantle surrounding the pile, and reaching about 20 in. underground and 10 above. The diameter of this mantle, which is made of wire gauze and cement, is about 0.2 in. greater than that of the pile in question. The space between mantle and pile is filled with mineral wool. A ring of pressed metal closes the mantle above and another does the same below, so that the rain cannot enter the space between mantle and pile.

It is usually well to use a layer of Norway tar or its equivalent between this ring and the wood, to make the joint perfectly water-tight. There is then bored in the pile a simple channel about an inch or a trifle more in diameter, above the mantle, clear to the center of the pile. This is enlarged by a red-hot iron, to effect carbonization of the walls of the bore, and keep the porosity of the wood constant. This hole has for its object the equalizing of the conditions between the interior and the exterior watery vapor.

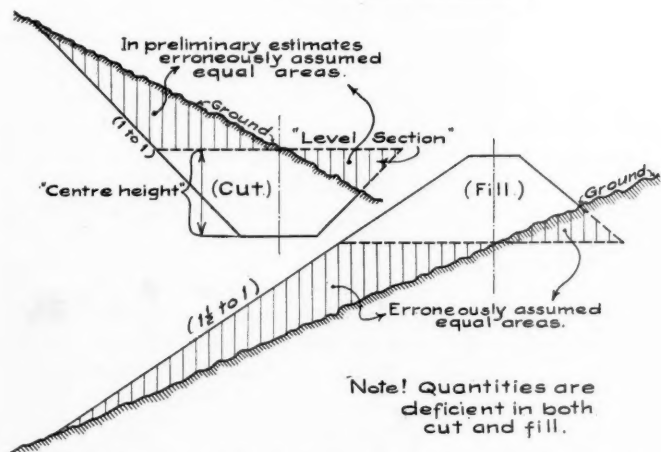
EFFICIENT EARTHWORK ESTIMATES.

BY J. G. VAN ZANDT,

Instructor in Civil Engineering, University of Illinois.

Preliminary estimates of earthwork quantities have always been a subject of discussion, because of the fact that they do not require any great exactitude, and hence engineers may

The reason for deficient earthwork quantities.



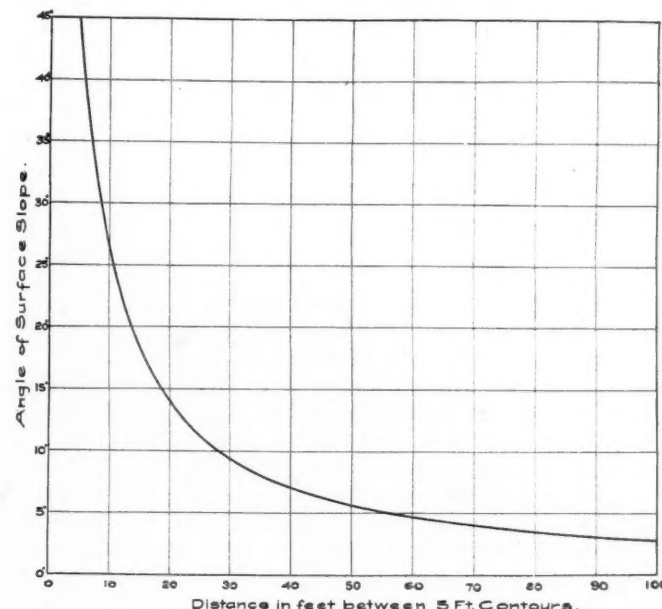
Effect of Changes of Surface Slope on Area of Cross-Section.

reasonably differ on the degree of precision that should be attained. It is probably true that one reason why engineers' estimates are frequently spoken of so disparagingly is that in assuming approximate quantities some of the essential items have been disregarded and the results have been accordingly inaccurate.

Among the items which must not be omitted, Wellington says, in his Economic Theory of Railway Location; that the surface slope is "one source of error that must be allowed for," and suggests that "this may be done by either using a coefficient to multiply the quantities when obtained or by working from a diagram." It is certain that in estimating merely from profile center-heights without taking this important matter into full

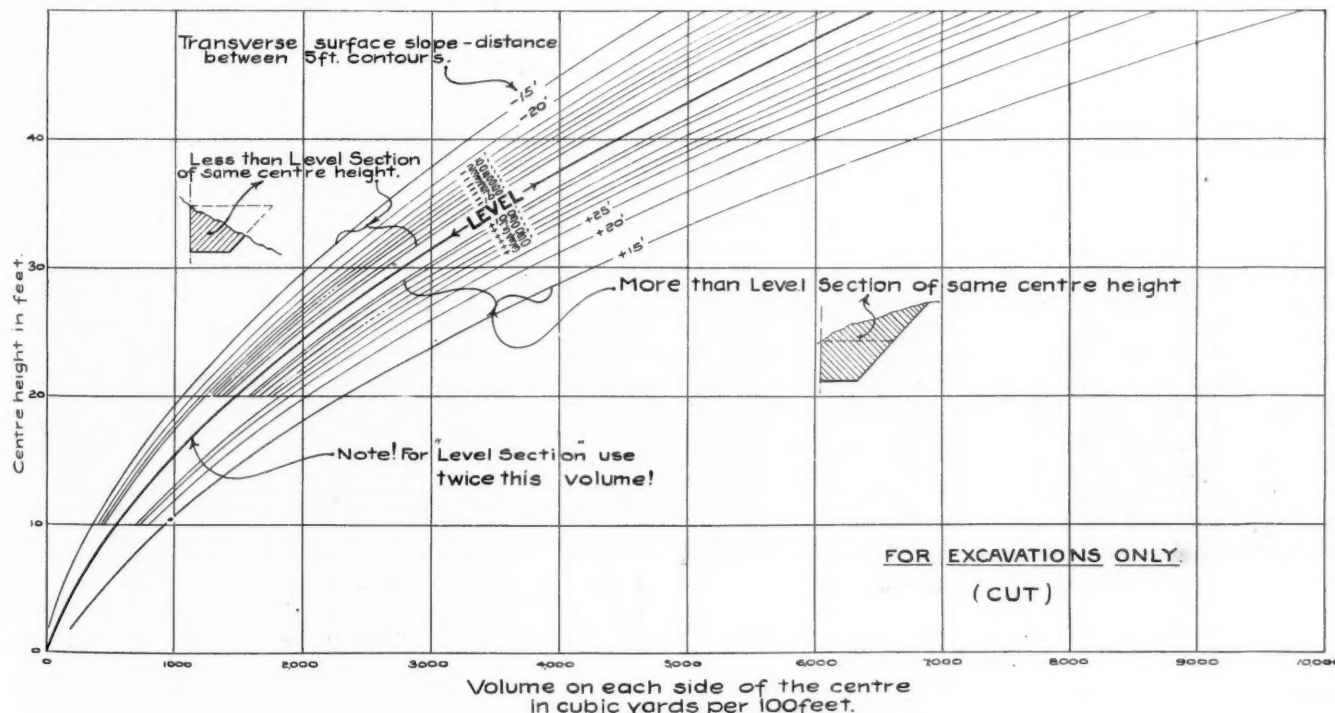
consideration there may be sufficient lack of precision in a single cut or fill to introduce a considerable error in the computation. Even when the equivalent level sections are used there is, according to Wellington, "a constant tendency to deficiency" in the estimate of quantities.

This deficiency of quantities in the estimate is contrary to one of the fundamental principles upon which all authorities agree, namely, that all quantities should be estimated liberally. In some cases an arbitrary percentage is added at the end "to



Relation Between Angle of Surface Slope and Horizontal Distance Between 5-ft. Contours.

be on the safe side," or an arbitrary amount is added to "make an even figure," and insure sufficient quantities. In every case the purpose has been to allow for the deficiency which common experience shows is characteristic of preliminary estimates, computed in the usual manner and known to be mathematically incorrect. One reason for this deficiency is clearly indicated in the diagram illustrating the effect of transverse slope on the area



Effect of Changes of Surface Slope on Volume of Earthwork. Base 20 ft.; Slope 1 to 1.

of the cross-section and showing the geometrical principles involved in computations using the level-sections from profile center-heights.

In country where the topography is especially rough and side-slopes are steep this becomes a serious problem. In the comparison of two or more possible routes the earthwork is an important item, and sure it may materially increase the cost it should be known to be within an estimated amount in order that financial interests may determine whether it would be profitable to make the investment or not. In these mountainous districts the earthwork is often the largest item of cost and the final construction work should show an improvement or a smaller volume of earthwork than the preliminary estimate. As it often occurs that the final yardage is greatly in excess of that originally estimated, and as in some cases financial difficulties have followed which have threatened the continuation of the work, it is proper that special precaution and care be exercised to eliminate constantly recurring errors which invariably produce deficient quantities, and which in special cases may affect the total materially.

Of course, in comparatively level country, the transverse surface slope is generally not of sufficient importance to be given special consideration, but it often happens that at river crossings or along stream bluffs there are surprisingly steep transverse slopes which should certainly justify attention. There is no place where error is more likely to creep in than in those locations where the usual conditions justify the practice of ignoring small errors, but which errors may at unusual places introduce large inaccuracies in the estimates. It is certainly evident that there is inconsistency in the practice of taking into full account small quantities on the level ground and then disregarding the effect of surface slope at some river bank where that effect may produce an error in yardage larger than any item that had previously been considered.

The effect of a slope of 30 deg. upon a 5 ft. cut is given by Raymond in his Elements of Railroad Engineering as amounting to an increase in volume of 60 per cent. He further suggests that "what sections may be considered level across may be determined by remembering that a cross slope of one in ten will be erroneously calculated by the level-section method by about 2 per cent., the truth being in excess, and a slope of one in five will be erroneously calculated by about 8 per cent." Steeper slopes increase this more rapidly, as they become very steep and may give rise to errors of over 60 per cent. as mentioned above. Raymond suggests, however, that "these values are roughly approximate and the more accurate method is to use a diagram for sloping ground."

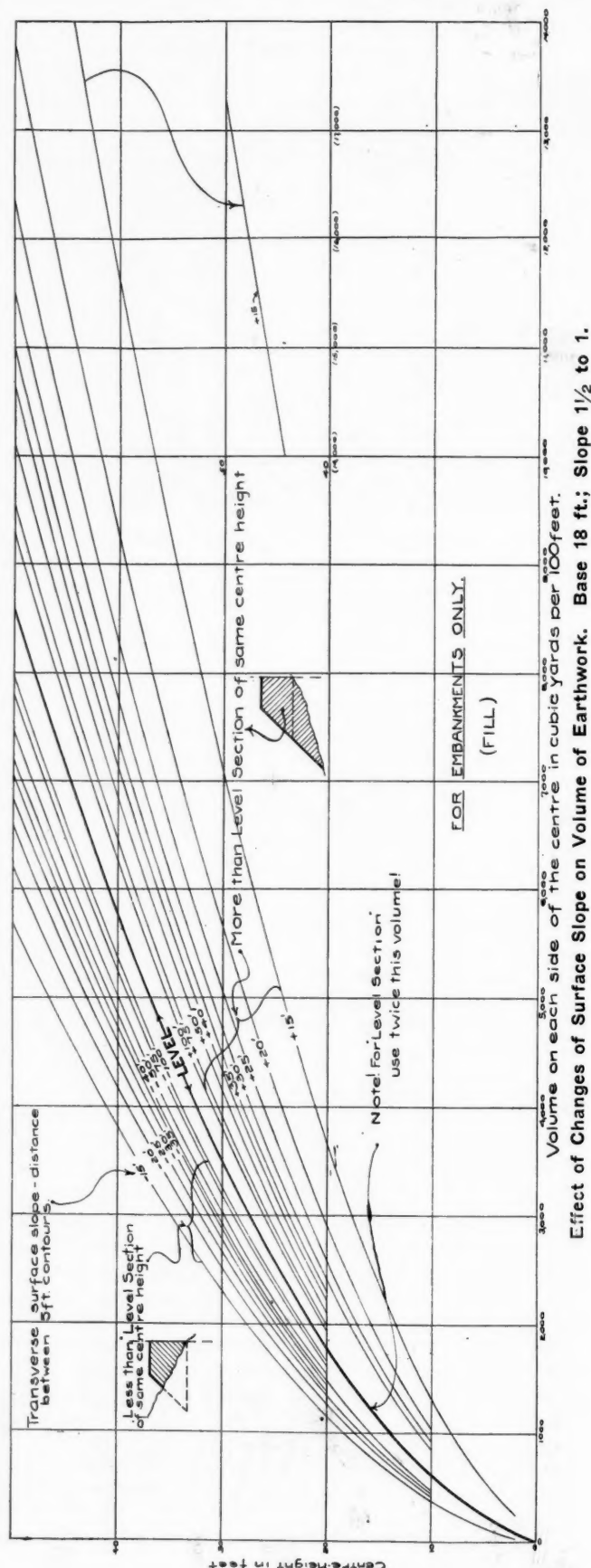
There has been a number of diagrams for earthwork in which the slope of the ground has been considered, among which those of Wellington and Trautwine are perhaps best known. These diagrams as well as the tables which consider transverse slopes are made on a basis of angle of slope in degrees. This requires that either the angle be measured in the field or calculated from other data. The latter method is most generally employed and frequently involves a considerable amount of computation. It has appeared that the work could be done more efficiently by the use of diagrams based on a contour slope-distance instead of angle in degree. The data may then be taken directly from the contour map and profile and applied to the diagram from which the volume of earthwork may be read. Standard diagrams similar to those shown herewith may be made for any roadbed dimensions and used efficiently in the field or office. In case reference was to be made to tables on the angle basis a curve as shown herewith would save time in changing from one system to the other. In fact all computation work involved in transferring data on the contour-distance basis to the angle-of-slope basis may be eliminated by the use of this diagram.

Many of the tables given for surface slope correction give quantities for equal increments to extreme angles of slope, and do not take into account the fact that in these extreme cases a change of 1 deg. may alter the total by a large quantity. It ap-

pears that when the surface-slope is very steep the cross-section should be taken approximately at least, if the quantity is to be estimated with a consistent degree of accuracy. On one of the western roads the following rule has been used:

"Where the transverse surface slope is steep and the 5-ft. contours are less than 15 ft. apart, cross-sections must be taken."

This limits the slope to one in three for the application of



graphical methods and requires constantly that necessary data be taken for extreme cases. Since it cannot be expected that the contours on a topographical map are located correctly within two or three feet on scales usually employed, it is evident that it would be inconsistent to use this data as the measure of surface slope when contours are very close together, especially since the effect of small changes is greatest when the distance between contours is small. As has well been said by Mr. Lavis in his *Railroad-Location Surveys and Estimates*, "estimating is, to a certain extent, of course, a matter of guess work and judgment," and "there is plenty of room for the engineer to exercise his judgment even after having obtained the most minute information." It was his practice "as soon as the profile of the projected location has been made" to indicate "where allowance must be made for steep transverse slopes," and to further urge that "every effort be made to collect all available data."

It might be suggested that the expense of making such diagrams as those given would not be justified by the results, but it will be remembered that not only are the corrections above outlined easily made, but the probability of error in the use of tables is reduced as well, and this has often been shown to be a decided item in efficiency. The time required for making the diagram is relatively small and the method resolves itself into the making of a few short calculations with a table of level section volumes, as follows:

(1) Formulae:

Let s = slopes (as $1\frac{1}{2} \div 1$ for fill, $1 \div 1$ for cut)

c = center-height (from profile)

b = width of base in feet

x = angle of slope in degrees

$\cot x$ = slope distance \div contour interval (5 ft.)

then the excess, E , of volume in cubic yards per one hundred feet of track, on one side of the center line would be,

$$E = \frac{(\frac{1}{2}b + sc)^2}{2\cot x + 2s} \times \frac{100}{27}$$

and the deficiency, D , on the other side,

$$D = \frac{(\frac{1}{2}b + sc)^2}{2\cot x + 2s} \times \frac{100}{27}$$

(2) Method. These values of E and D are added to or subtracted from a table of level section values or a single value of $E - D$ may be added to the tabular values to give the corrected volumes for changes of surface slope, which may then be plotted to any convenient scale.

Should it be desirable to make provision for changes of slope in the cross-section, which is more often the case than not, the data may be plotted, as shown in the charts already mentioned, and in cases of high fills or deep cuts this may prevent introducing a large error from assuming a uniform slope. In fact in some cases the ground may slope away from the center or be nearly level on one side and steep on the other, in which cases this form of diagram is convenient. There are other advantages also for this form of diagram among which may be mentioned the important fact that smaller quantities are plotted, and hence a larger scale may be used which increases the accuracy of reading the diagram. By the use of an ordinary scale, or special odometer designed for the purpose, the volumes may be read with consistent accuracy.

A method of tabulating the data which has increased the efficiency of the work and further reduced the probability of error is given below:

Form for Use with Earthwork Diagrams.

A. B. & C. R. R. Earthwork Estimate for Mile

Station.	Average Ctr. Height Cut or Fill.	Contour Slope Dist.		Volume.		Remarks.
		$\pm L$	$\pm R$	Cut. L | R	Fill. L | R	

The station numbers may be placed between the lines of the rest of the data in the table to assist in the identification of the item and the profile center heights, and contour distances may all be put in place before the diagram is used. Under remarks any unusual items, such as tunnels, trestles, bridges, or extremely steep surface requiring cross-sections, may be noted. The reference to book numbers in which the data may be found is also to be recorded under remarks. When the slope-distance is the same on both right and left, it may be given in one column or the other and a line drawn through the other side, and when level section a line may be drawn through both sides.

While it is obvious that there are many other items in the preliminary estimates which affect the total substantially, it appears probable that if these other items are considered with the same consistent accuracy that is suggested for the earthwork quantities the estimate may become a more satisfactory and reliable document, not only for the comparison of lines and fixing of grades, but also as an estimate of the approximate cost of the work for the consideration of the financial interests.

STUDY OF RAILS FROM PENNSYLVANIA LINES WEST.

Bulletin No. 135 of the American Railway Engineering Association gives the results of a study of 17 good rails taken from service on the Pennsylvania Lines of Pittsburgh. Ten of the rails were from the Northwest System and were removed under the direction of R. Trimble, chief engineer of maintenance of way, and the other seven were from the Southwest System, and were removed under the direction of W. C. Cushing, chief engineer maintenance of way. The rails had been in service from 7 to 17 years in main track. The tests made on these rails included etchings with picric and sulphuric acids and analyses of borings from the interior of the head, tests of the tensile strength of samples from the interior of the head and micro-photographs.

The analyses showed that the carbon content was within the limits prescribed by the Association's specifications, with the exception of four rails. The phosphorus is above the limit prescribed; in some cases very much so. The manganese is well within the specified limits, and the elongation showed up very well in all but two cases. The rails taken from the high side of curves did not show any indications of tendency to failure not found in the rails from the low side.

MAINTENANCE OF WAY EFFICIENCY.*

BY E. R. MEREDITH,

Supervisor, Philadelphia & Reading, Coatesville, Pa.

Efficiency in maintenance of way work is almost entirely relative. While the desired results are, broadly speaking, the same, the methods and means must be varied to suit widely differing conditions of financing or of operation. The problem consists in applying to the upkeep of a given mileage certain money expended for labor and material, so as to get the best results.

The money expended in maintenance work may be divided under three general heads, labor costs, material costs, and interest on capital tied up in stock on hand. In the expenditure of labor, local conditions are of paramount consideration, but several general rules may be laid down that apply to all labor expenditures. The first and most important of these may be expressed as follows: "Every re-handling is a dead loss." Every time the section force puts a truck on the track to handle material that could have been unloaded from the car at the point of use, it is wasting money. The labor of reloading excess material is a dead loss to the company, chargeable to the officer who over-estimated the material needed at the given point. Similarly two or three work train trips to supply material that could have been handled by one train movement mean the expenditure of money for which the property receives no real benefit. To

*Entered in the contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

be successful in his chosen field, the maintenance officer must so plan his work and so dispose of his material that every movement of his men and every handling of his material is of direct gain to the work in hand. He must impress on his subordinates responsible for such work the importance of living up to this rule.

The second consideration in the handling of the labor item may be summed up as *esprit de corps*. To the roadway man, this means an individual loyalty to the employing railway, a healthy rivalry in the pushing of the work, and a flexible and well-trained organization. Personality enters greatly into the development of such a spirit among the men.

Recognition of individual excellence among the various foremen by money prizes, or even official annual ratings will go far toward bringing forth a rivalry in efficiency. An insistence on careful policing, well kept station grounds, and clean and orderly tracks and yards soon breeds a personal pride in the better foremen, or reveals by its absence the men who should be marked for demotion or discharge. Discipline for violations of the rules should be quick and keen, and always just, divorced entirely from the personal equation. Occasional bulletins showing discipline inflicted for the various offences during a given period will call the attention of the force to the need of observing the rules and the penalties of disobedience. Merit recognized by promotion, and a careful understanding by the employer of the character and ability of the individual laborers, so far as possible, will enable the employer to have at hand material to fill any vacancy that may occur, and will stimulate endeavor among the foremen, as they realize that their places can be filled at short notice, without detriment to the organization.

The handling and disposition of material offers a wide range for efficient management, as outlined above, but its economic use offers an even wider one. Personal inspection of ties, frogs, rail, switches, etc., which are reported for renewal, will enable the supervisor to save many times his salary every year. Careful sorting of material by disinterested parties to keep out of the scrap pile what may be economically repaired will show a large profit for the labor expended.

Capital tied up in stock on hand is usually given scant attention by subordinate roadway officers, but large savings can often be made in this line. Frequently on a single sub-division thousands of dollars' worth of materials are constantly on hand over and above the actual needs of the territory. The mobility of emergency material is a matter that deserves serious thought from every supervisor. The equipment of a car or two with emergency material and an understanding with the train runner as to the location and handling of such cars enables one to dispense with the old-time custom of keeping a supply of frogs and switches at every tool-house, even under the heaviest traffic. The supplies of other emergency material can be cut down to a minimum by careful supervision, and large amounts of capital tied up in this way can be released. Where various sections of rail are in use, a gradual weeding out of the switches and frogs laid with other than the ruling section will make a great reduction in the amount of stock needed on hand. Foremen also are prone to hoard up tools and material of which they have no actual need, and a rigid supervision must constantly be kept over their supplies of all kinds. Negligence in this matter always results in the accumulation of larger supplies at the section headquarters than is consistent with economy.

In summing up the subject, the best of intentions and the hardest of work go for naught unless efforts are directed and zeal applied with judgment and understanding. The directing officer should map out a comprehensive plan of his work, and keep its outlines developed weeks and months ahead, so shaping and correlating the movements of his forces that each man will do his part and that each dollar's worth of labor will further the completion of the general plan. In this way the physical effort of the laborer, the practical knowledge and skill of the foreman and the executive ability of the supervisor or road-

master will combine to give the best net result for the least money. To the writer it appears an unquestionable fact that true efficiency is not dependent so much upon superior equipment, type of labor, or even hard work as upon the executive ability of the directing officer. Much, of course, depends upon well-kept and up-to-date equipment and more upon strong, sturdy and willing workmen, but in the final reckoning, the brain work of the heads of its various sub-divisional units makes or mars the efficiency of any maintenance of way organization.

HOW THE ROADMASTER CAN PROMOTE EFFICIENCY.*

BY F. W. RIZER,

Assistant Engineer, C., B. & Q., Chicago.

The maintenance officer of today is confronted with many serious problems in making his appropriations cover the many demands of heavier traffic and equipment at higher speed, which require heavier track, stronger bridges, more interlocking plants and block signals, and many expenditures for public accommodation which yield no revenue. The cost of railway labor and material have increased materially, and although the gross income has increased, it has not increased in the same ratio.

It is evident that some means must be provided by which the unit cost of maintenance shall be reduced, and as the cost of material, being governed by the laws of supply demand, cannot be lowered, this reduction must be effected in the labor charge.

Our trackmen are a hard-working, conscientious body of men, anxious at all times to learn, but with the many new and various forms of track appliances now in use, concerning which the trackmen have received little or no instruction, high efficiency cannot be expected. I have many times seen track appliances improperly installed, resulting in short life for the device and no benefit from the money invested. The section foreman should receive instruction as to the proper method of performing certain work, also as to the use and care of tools, as good tools are expensive, but will last for years if given reasonable care. Instruction should also be given concerning the construction and maintenance of frogs, switches, crossings and all track appliances so that the foreman may know how to correctly make minor repairs on the ground, which will not only save the cost of handling and the shop expense, but will materially add to the life of the device. The following instances illustrate the necessity of this instruction.

On most roads an attachment is provided on switch rods to take up the wear in the points, also to compensate for variations in the rod and switchstand. These attachments usually consist of an eccentric pin or bolt, and it is a simple matter to make the proper adjustment, but one can many times see when the foreman has placed washers and nut locks between the switch tees and the point rails instead of properly making the adjustment. In one instance a switch was reported out of order, in which it was found that the plate on which the hold-down pocket was secured had become skewed and did not allow the hold-down on the frog to enter the pocket, causing the spring rail to stand about half-open. A few blows of the spike maul straightened this plate and the spring rail moved to the proper position. The trackman did not understand the switch and did not know how to fix it.

Another illustration of this point was brought out where an inspection of a piece of track showed that a certain kind of nut-lock had been applied with the wrong face bearing against the nut, rendering the nut-lock useless and, in many cases, ruining it on account of its being tightened up too hard and its threads being stripped.

One of these cases would have occurred if a little time had been spent explaining these devices and the foreman had fully understood what they were using.

*Entered in the contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

The company's standard track plans should be a source of much valuable information to the trackman, and the various plans should be explained to him in detail. A meeting of the roadmaster and foreman at regular intervals, where all could discuss various features of their work, would be of much benefit to the company and to the men.

Assuming that our trackman has benefitted by his instructions, what saving will he effect? This is, of course, an unknown quantity, but suppose that he would make a reduction of \$1 per mile per month on account of his better understanding of methods and materials. On a railway of 10,000 miles this would mean a reduction in the maintenance of way account of \$120,000 per year, accomplished by each man performing a trifle more work and by conserving the track material and tools in his care so that they would give longer service.

TRACK EFFICIENCY.*

BY L. C. LAWTON,

Division Engineer, A., T. & S. F., Newton, Kan.

There can be no true economy in track labor under the present transitory conditions of labor. Even the road master who deplores the fact that he is not making any section foreman, but who in the same sentence says he is not troubled by it, as he expects his present foreman to last as long as he holds the office, is of little more use to the railway than the tramp track man. In other departments of the road a system has been worked out whereby the men and officials of tomorrow are being produced. When this time comes in the track department we will have a wage on the section that will make the place desirable. We will have men of families, and have them well housed where their children can be in school. We will have their boys apprenticed on the track and give those who earn it more training in mechanics and in the engineering department. Both men and foremen will be able to look for increased pay for better work, and at the end for a pension. Thus every man would be a trained track man and a possible foreman.

Until this millenium comes the roadmaster must start with his foreman and work them into an interested organization. He must make each man proud of his position and let him know that he is the representative of the company for his section; make him feel that he is not merely to look after the joints, but that the railway's interests are just as much cared for by keeping stock off the right of way, or by seeing that his ditches do not wash cinders in on the farmers' pastures. Every railway is spending thousands of dollars now to settle the enmities caused by aggressive or unscrupulous employees during the time of less competition and more favorable legislatures. To overcome this, many meetings are being held to promote harmony and a general campaign is being made to show that the interests of the people and the railways are identical, but without giving those nearest the land the prestige or desire to meet the owners in like manner. Impress your men with the idea of meeting the farmer outside of the right of way with the comradeship of equal land owners. In that way they would be led to see the farmers' side, and many little things that irritate would never develop into the prejudice some have against the railways. Only by the developing of a loyal, energetic and at the same time tactful, set of foremen can the old regime be restored.

To promote efficiency, specialize. Know each foreman as you do each bad piece of track. Know how much he can do alone, and try to give him what he is lacking. Study the section through the foreman by knowing each cut and bad piece of dirt as he should. Encourage him to experiment with a piece that needs drainage or be able to give him expert advice. Whatever you do, do not let him continue to

raise a bad piece of track or slide, in one way year after year. Keep your men up to date to the standard work on your road. We often find a foreman who does not understand what is wanted after stakes are set by the engineering department, as, for instance, when a new spiral is staked on curves. No system of track standards can be carried out unless your foreman thoroughly understands them and grasps something of the fundamental principles back of them. Let him have an assistant, in name at least, so the foremen can come together once a month to discuss maintenance matters. You will be surprised how much you can learn at such meetings; besides you will want that assistant after a while. Keep yourself informed as to best methods of other roads, and work up a "road" spirit, with the idea of going them one better.

More than any other one thing, encourage the foreman with new foreign labor. He does not know their language, is often worked against by the interpreter, and does not get the work done at first that he feels he should, and then he suddenly loses all ambition. Teach him the peculiarities of the people he is going to have, and successful methods used by other foremen. See that he is interested in these people and give them every assistance possible in getting comfortable homes. Only in that way can you count on permanent laborers and then only will the general efficiency be increased and your trouble in keeping laborers cease.

Keep in close touch with the foreman, but do not bother him with reports that are properly the work of your clerk. When requesting information, have a blank to fill. In writing up bad spots in track have a regular form showing the location and nature of the trouble, and two columns left blank for the foreman to fill out, with the date fixed, and, if necessary, the cause of the trouble. These should be returned to you, and in that way you will know that your "spotting" means something. A foreman will be more careful with track when he has to explain an obvious carelessness.

You are spending large sums in cleaning cuts, cutting right of way and keeping weeds out of branch lines. You can do this cheaper by sodding the cut slopes, getting the right of way into a good sod or allowing the farmer to put it into alfalfa or clover and by keeping the weeds down with cinders on screenings. You will have to prepare the figures to "show" the superintendent, these things but you can do it. In all this you are building for the future by doing necessary work and at the same time cutting your next year's charges. Always keep in mind that there is to be a railway there for a hundred years to come and make your work count against that time.

PROMOTING EFFICIENCY THROUGH THE FOREMEN.*

BY B. JAMES,

Supervisor, C. & E. I., Marion, Ill.

Roadmasters can promote efficiency by obtaining the very best men possible for foremen, and at all times selecting the best men from among their labor force to fill any vacancies that may occur. By so doing they will encourage the men to stay with their work, as they may look forward for promotion.

Also the foremen should be trained to work according to some prescribed system, and to work in such a way as to take advantage of the different seasons of the year to do the different kinds of work. It is also a good plan to get the foremen as deeply interested in their work as possible in order that they may look after it as though it were their own enterprise and their own money was being expended thereon. Roadmasters should also be close observers and study the character of their foremen in order to best know how to handle them, as all men cannot be handled in the same way.

*Entered in the contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

*Entered in the contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

MEXICAN LABORERS' HOUSES ON THE SANTA FE.

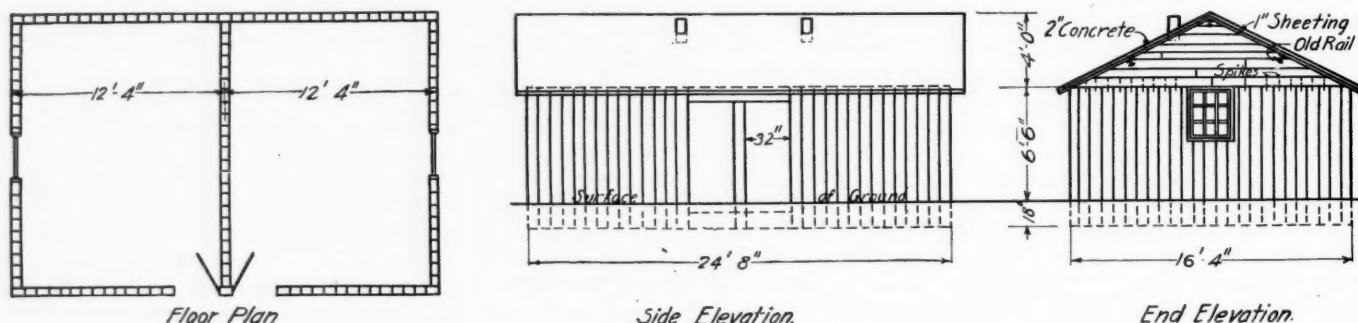
BY L. C. LAWTON,

Division Engineer, A., T. & S. F., Newton, Kan.

One of the most serious problems of railway maintenance between the Missouri river and the Rocky mountains is that of securing and holding a sufficient supply of labor. Until the recent war in Mexico, Mexican peons were used almost exclusively on the Santa Fe; they are still used when they can be secured. The young Mexicans develop into a vagrant class, quite similar to the American hobo, within a short time, and to obtain a better trained and steadier class of laborers efforts are made to locate men with families on each section. This requires

hand 1 in. sheeting, 80 lineal ft. of second-hand 2 in. x 6 in. timber, 130 lbs. of second-hand barbed wire, 78 ft. of old 52 lb. rail, two 9 light sashes, 29 in. x 35 in., 875 lbs. of cement, $3\frac{1}{2}$ cu. yds. of screenings, and two 12 in. lengths of 8 in. sewer pipe. The screenings are secured from rock ballast such as is used on the track, costing from 10 to 20 cents per yd., and making a waterproof concrete.

Plan B shows the type of house erected in conspicuous places along the main line. In this case old bridge ties are laid flatwise and shaped with mud or adobe, the partition being made in the same way. The material required for this house consists of 215 old ties, 57 board ft. of second-hand 1 in. sheeting, 140 lineal ft. of second-hand 2 in. x 8 in. timber, 36 lineal ft. of 3 in. x 8 in.



Section Laborers' House for Branch Lines.

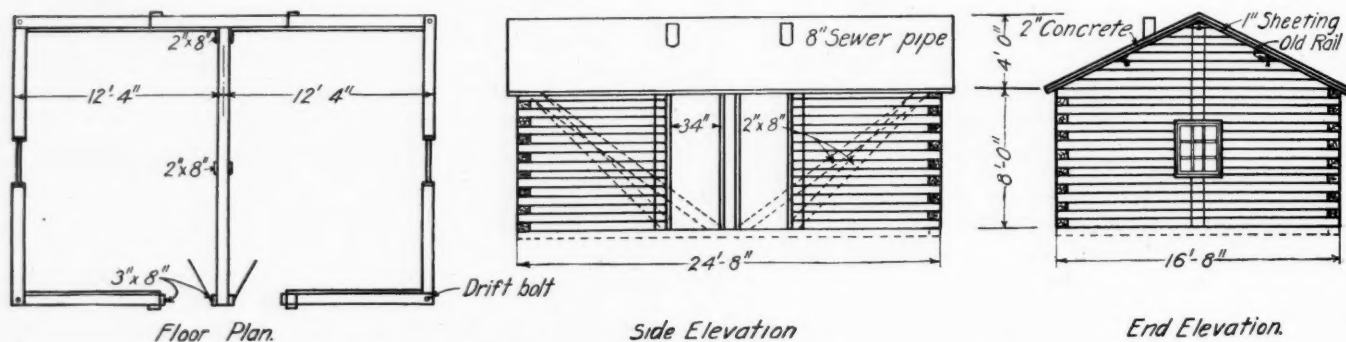
housing these laborers in a way not before attempted to any extent by the Santa Fe. The few families that have been employed previously have constructed their own dug-outs, or tie houses with mud roofs, similar to those usually found in New Mexico, but there is no earth in Kansas which will turn water or stand up like the adobe in the arid country, and it has been common after a heavy rain for the occupants of these dirt-roof houses to leave, the railway thus losing its section labor.

A very cheap but more substantial house has therefore been planned, as shown in the accompanying drawings, the particular advantage of which is that all material is scrap or second-hand, and can be picked up on any division and the house built by the men themselves. The style shown in plan A is erected in inconspicuous places on the main line, and on all branch lines, material being more readily secured, as either sawed or hewn ties will

timber, 130 lbs. of barbed wire, 78 ft. of old 52 lb. rail, two 9 light sashes, 29 in. x 35 in., 875 lbs. of cement, $3\frac{1}{2}$ cu. yds. of screenings, and two 12 in lengths of 8 in. sewer pipes.

STANDARDS FOR REINFORCED CONCRETE DRAWINGS.

The variation in the standards on drawings of reinforced concrete is so great that many engineers have felt the need of some standard for such drawings which would make them more universally readable. A recommendation for such a standard has recently been made by the committee on Reinforced Concrete Practice of the Concrete Institute of Great Britain, which includes the proper scales for drawings of various classes and the proper conventions for showing reinforcement. Three scales are suggested as being sufficiently elastic to cover all conditions:



Section Laborers' House for Main Lines.

suffice. Side walls are formed by ties set on end 18 in. in the ground, with the cracks chinked with mud or concrete made from rock screenings. Where the cracks are wide they are covered with scrap boards. The partition is built in the same way as the outside walls. Old rails are used for the rafters for the roof, over which a layer of 1 in. sheeting and 2 in. of concrete made from screenings and reinforced with wire netting or second-hand barbed wire are placed. One length of 8 in. sewer pipe is used for the chimney. A 3 in. layer of concrete is placed on the floor in some cases, and in others simply an earth floor is provided. The complete list of material provided for the house includes 165 old ties, five old sawed ties, 570 board ft. of second-

$\frac{1}{8}$ in. for framing plans and slab reinforcements; $\frac{1}{2}$ in. for general detailed drawings and $1\frac{1}{2}$ in. for detailed sections. For very large jobs small scales would have to be substituted. On drawings to $\frac{1}{2}$ in. scale main reinforcing bars would be shown by thick, solid lines; secondary reinforcing bars by medium solid lines, and the outlines of the concrete and other details by thin solid lines. With this scale it is usually advantageous to omit reinforcement in adjoining parts. With $1\frac{1}{2}$ in. scale bars should usually be shown by double lines. The committee thought it inadvisable to color drawings of reinforced concrete or to dot in the concrete in any way, since, if it is necessary to reproduce the drawing, the reduction would ruin the effect of the dotting.

General News Section.

In a fire at Brownsville, Tex., August 1, the office building and freight house of the St. Louis, Brownsville & Mexico was destroyed; loss, \$40,000.

A charter has been granted at Altoona to the Brotherhood of Railroad Shop Men, an organization which seems to have been formed in opposition to the American Federation of Labor.

The station and train employees of the Interborough Subway, New York City, now dress in white duck uniforms. The new clothes are paid for by the company, and will be washed at the company's expense.

Both houses of Congress have passed a bill or resolution authorizing the army and navy to participate, next year, in the festivities which are to be held in connection with the completion of the Florida East Coast Railway.

The Chicago & Northwestern has ordered from the United States Electric Company, New York, 38 Gill Selector local battery Bell telephone train despatching outfits, together with two 40-key cabinets for Gill calling keys.

The Toledo & Ohio Central has ordered from the Western Electric Company, Chicago, telephone selector equipments for a telephone train despatching line from Bucyrus to Toledo, 70 miles, and for another from Bucyrus to Thurston, 78 miles.

George W. Bennett, general foreman of boilermakers in the West Albany shops of the New York Central and president of the Master Boilermakers' Association, has been appointed a district boiler inspector by the Interstate Commerce Commission.

The Southern Pacific, always ready for new ideas, has abandoned the use of green flags as tail-end markers on passenger trains and the first of August saw the last of them on all Southern Pacific passenger trains, lamp markers being used in place of them, day and night.

Senator Jones, of the state of Washington, has introduced in Congress a resolution calling upon the president to make a survey for a railway from Controller bay, Alaska, to Mantanuska and the Bering coal fields, and submit to Congress an estimate of the probable cost of such a line.

The Nashville, Chattanooga & St. Louis has established auditor revising clerks at junction points with connecting lines, to check through billing. One man, during June, corrected 418 errors made by connecting lines. In many cases he telephoned connections for authority to eliminate these overcharges.

The Oregon-Washington Railroad & Navigation Company has brought suit in the United States Circuit Court, at Portland, asking an interlocutory injunction restraining the Oregon State Railroad Commission from enforcing the 14-hour state employment law. The company operates, and desires to continue, under the 16-hour federal law.

The new freight classification yard of the Pennsylvania at Northumberland, described in the *Railway Age Gazette* last March, pages 491 and 682, has been opened for business. This yard covers 700 acres of ground, and is over three miles long. The engine house accommodates 52 locomotives, and there is a large freight transfer shed.

The roundhouse and shops of the Washington County Railway at Salmon Falls, Me., were destroyed by fire August 9; loss, \$110,000. Eight freight cars were destroyed and nine locomotives and nine passenger cars were badly damaged. As the Washington County has now been absorbed by the Maine Central, it is conjectured that these shops will not be rebuilt.

A plan by which the cost of the pending investigation into the practicability of electrifying the Chicago railway terminals will be properly apportioned among the interested roads has been decided on by the General Managers' Association of Chicago. In making the assessments against the different roads such factors as mileage of tracks within the city, passenger terminals, wheelage, and amount of business as determined by earnings, will be considered. It is estimated that if the investigation requires two or three years, as is expected, it will cost between \$200,000 and \$300,000. As previously mentioned from time to time in the *Railway Age Gazette*, the following staff of

engineers is in charge of the investigation: chief engineer, Horace G. Burt; electrical engineer, Hugh Pattison; terminal engineer, Louis H. Evans, and mechanical engineer, Theodore H. Curtis.

Telephone despatching is now in operation on the Coast Division of the Southern Pacific between Salinas and Santa Barbara; also over the entire Shasta division; on the Sunset, the Sunset and Western and the McKittrick branches, and will soon be installed between Sacramento and Sparks. The dispatcher has full control over the line, and no operator is allowed to call up another station. The dispatcher will do the calling for him if business requires it. According to an officer of the S. P. it is only a question of time until the telegraph will serve only as an emergency service on that road.

The Chicago & Western Indiana has now acquired all of the property necessary for its proposed passenger station at Polk and Dearborn streets, Chicago, to replace the old Polk street depot. Judgments amounting to \$199,587, and covering three lots on Federal street, south of Polk, have been before the court since June 5, and have finally been decided in favor of the railway. With the acquisition of this property the railway now owns all the land between Clark and State streets, from Polk to Taylor streets. The litigation, involving the condemnation of the property, was bitterly contested throughout the trial and extended over a period of seven weeks. The owners of the land claimed that it had a value for railway purposes of from \$4,000 to \$5,000 per front foot, while the railway placed its value at from \$1,000 to \$1,200 per front foot. The verdict gives a valuation of \$1,700 per front foot.

Postmaster-general Hitchcock has sent to Congress a communication recommending a radical readjustment of the basis on which the government shall pay the railways for carrying the mails. He would pay the carriers on the basis of cost, with the addition of 6 per cent. profit, the cost to be computed not by weight, but by the amount of space used in the cars, with proper modifications for large quantities of mail and frequent trains. He thinks that he would thus save \$9,000,000 a year. At the hearings before the special commission in New York City last week the estimates of the second assistant postmaster-general, purporting to show the cost of transportation of second-class mail, were discredited by the testimony of a former second assistant postmaster-general, who declared that no statistics had ever been gathered relative to the transportation of the mails which would afford any reasonable basis for the averages which are now given out by the department.

Great Northern Hotel Train.

Members of the Minnesota State Automobile Association last month—July 20-28—made an automobile tour from St. Paul to Helena, about 1,200 miles; and they took their hotels along with them—or rather they took a single hotel, consisting of an engine and 12 cars of the Great Northern Railway. The tourists in their automobiles traveled from 120 to 210 miles a day and their hotel train kept along with them, reaching each stopping place in time to be ready to receive the guests for dinner or supper as might be necessary. The train consisted of a baggage car, containing a dynamo; a garage car; 5 standard sleeping cars; 2 dining cars; 2 business cars and 1 observation car. On each division it was hauled by a single powerful locomotive. According to a statement issued by H. A. Noble, general passenger agent, the hotel train left St. Paul Thursday, July 20, at 8:30 a. m., and made stops as follows: noon, St. Cloud, evening, Alexandria, 140 miles; Friday noon, Barnesville, evening Fargo, N. D., 121 miles from Alexandria; Saturday noon, Grand Forks, evening Devils Lake, 195 miles for the day; Monday noon Rugby, evening Berthold, 195 miles for the day; Tuesday noon Williston, evening Culbertson, 167 miles; Wednesday noon Glasgow, evening Malta, 183 miles; Thursday noon Havre, evening Great Falls, 210 miles; Friday noon, Wolf Creek, evening Helena. Mr. Noble gives the length of the tour from St. Paul to Helena as 1,288 miles. Musical and other entertainments were given in the observation car each evening; and Al Ray, the chief of the Great Northern detectives, accompanied

the train to protect the passengers from train robbers; and we are told that not only were the autoists heavily armed, but that Dr. Dutton, referee in the contests of the cars, "is one of the best pistol shots in the United States." The dining cars proved themselves popular in spite of the "hospitable eagerness" of the people along the route to entertain the tourists. The garage car carried all sorts of material and facilities for repairing automobiles, and the vacuum cleaners of the sleeping cars were used to clean out the automobiles. The train was furnished with telegraphic news twice a day and had all of the other conveniences of the most complete express trains.

Threatened Railway Strike in England.

Agitation, looking to a strike of railway and dock employees throughout England and Scotland, has been the principal topic of news in the cable despatches throughout the past week; and in Liverpool on Tuesday there was serious rioting and over 3,000 soldiers were on duty to aid the police in keeping order. Two persons were killed by the troops and the situation was described as a reign of terror. A strike of dock laborers in London last week was settled in a short time by the granting of a large part of the workmen's demands, though not until there had been enormous losses, due to delays in transporting food, accompanied by fears of a partial famine. Thousands of tons of perishable provisions were left to rot on the docks. The railways were tied up, partly by the difficulties in the city and partly by small strikes among their own men. The members of the railway brotherhood are under an agreement with their employers binding them from 1907 to 1914 to submit all disputes to arbitration, but the excitement of the strikes and disorders which have taken place, and the apparent success of the demand made, appears to have thrown the railway employees off their feet. As we go to press the brotherhoods of railway men throughout the United Kingdom are reported as having decided to go out on strike within 24 hours.

Mr. Buxton, the president of the Board of Trade, conferred with the railway managers Wednesday morning and with employees' representatives in the afternoon, both sides having refused to concede anything. Mr. Buxton asked the companies to agree at least to a discussion with the union, but the companies refused. How far the unions will be able to tie up traffic is the question. The railway companies promise an effective though restricted service. Sir W. Guy Granet, general manager of the Midland, which has offered a bonus of 50 per cent. on the amount earned during the strike to such of its men as remain loyal, said: "The government has undertaken to put at the service of the railway companies every available soldier in the country. We have been arranging with the war office this afternoon where the troops shall go, and everywhere troops are moving to the principal centers in the north of England and in the midlands to insure that the railway service shall be carried on. The government realizes that the recent partial strikes paralyzed the trade of the country, and that if transport were further held up conditions would go from bad to worse, so every nerve is being strained to prevent internal transport from coming to a standstill. The railway managers have made adequate arrangements to carry on an efficient but necessarily curtailed service of passenger and goods trains, but if adequate protection fails us, of course we cannot carry it on. England is a wonderful country for railways. You may shut up one line, but it would require an extraordinary organization to shut up all the routes to the great centers. I do not anticipate that more than 25 to 30 per cent. of the men will come out, but our preparations are made on the assumption that 75 per cent. will cease work. Where there are signal boxes, say three miles apart, we shall make our signaling stations twenty miles apart by shutting up the intervening signal boxes, and, failing signal boxes, we can flag the trains. All the railway systems will be worked as one. Special time tables have been prepared of curtailed services of trains, something similar to those in operation on Sunday. First and foremost our efforts will be concentrated on providing food for the people in the large towns. . . . If the men wish it, there will be a fight to the finish."

Ninety-two Miles in 66.56 Minutes on a Motorcycle.

An "Indian" motorcycle has been driven for an hour at a greater speed than was ever accomplished by any other vehicle

traveling on wheels; or, to be exact, 92 miles in 66 minutes, 33.6 seconds. This statement is made by the company which manufactures the motorcycle and is based on a test made by Mr. de Rosier, riding on a mile track at Playa del Rey, Cal., February 7 last. Mr. de Rosier started to see what he could do in one hour, at the end of which time he had covered 83 miles, 135 yards; but the managers of the test instructed him to keep on, hoping to make a record for 100 miles, their purpose being defeated, however, by the failure of his supply of gasoline. The rate in miles per hour for the 92 miles was 82.93. The best time which has been made by de Rosier for a single mile was 40.8 seconds.

Illuminated Slow Boards.

The London & Southwestern has lately installed a number of roadside speed notices, which, from the description that is given of them, appear to be similar to those in use on the Northern of France and described some time since in the *Railway Age Gazette*. This indicator consists of a large lantern fixed on a post and having a translucent glass front bearing on its face figures indicating the rate of speed, in miles per hour, to which trains are limited in passing over the curve or other hindrance immediately in advance. Each lantern is provided with two long-burning oil lamps, which are kept burning both night and day. For a given piece of track three indicators are used; first, one at a distance of about $\frac{1}{4}$ mile in the rear, bearing numerals showing the rate of speed; second, one bearing the letter C, which is at the commencement of the section to which the speed limit applies; and a third, bearing the letter T, showing where normal speed may be resumed.

Iron and Steel Exports and Imports.

The exports of iron and steel manufactures during the fiscal year ended June 30, 1911, aggregated 1,910,298 tons or \$230,725,351 in value against \$179,133,186 in 1910 and \$183,982,182 in 1908, the previous high record. The growth during 1911, which exceeded that of any earlier year, was distributed among nearly all the important classes of iron and steel exported. The rails exported in 1911 amounted to 391,428 tons, as compared with 369,578 tons exported in 1910. The structural iron and steel exported during 1911 was 176,085 tons, as against 120,228 tons in 1910.

The following table shows value of exports for the first six months of the calendar years 1911 and 1910:

	1911.	1910.
January	\$18,739,961	\$14,513,394
February	18,690,793	13,949,082
March	22,591,848	17,358,503
April	24,917,056	16,529,260
May	20,616,795	17,058,042
June	20,310,053	16,503,204
Totals	\$125,876,506	\$95,811,485

The imports of iron and steel manufacturers in 1911 were 565,937 tons, an increase of 46,856 tons over last year. Imports in June, 1911, totaled 29,394 tons, compared with 23,375 in May, 1911, and 30,322 tons in June, 1910. This shows that the general trend of imports has been lower while that of exports has been higher.

Eighteen-Hour Train Derailed at Fort Wayne.

The Pennsylvania Special, the 18-hour Chicago to New York train which left Chicago at 2:45 Sunday afternoon, August 13, was derailed just west of Fort Wayne, Ind., and four employees were killed and four trainmen, 17 dining and Pullman employees, three mail clerks and 29 passengers, were injured. The train was running late and was being pulled by two engines; and was derailed while running at high speed over a sharp curve at the west end of the track elevation work under way in Fort Wayne. Both engines and four cars left the rails. The engine of a freight train standing on an adjoining track was struck by the two passenger engines and all three were wrecked. The injuries were confined to trainmen and passengers in the forward coaches. The train was made up wholly of steel cars, and to this fact may be attributed the escape of the passengers from fatal injuries.

The Chicago *Record-Herald* gives the following details:

Charles P. Skillman, who resides directly opposite the spot where the wreck occurred, saw the whole thing as he sat on his veranda. "The passenger train," said Mr. Skillman, "was coming

at a terrific rate of speed. Just across the bridge which spans the St. Mary's river it veered into a new switch placed there because of track elevation work. I think the train was going at too great a rate for the switch to stand, for as I watched it seemed to me that the rails of the switch slid from under the passenger directly over to the freight train standing on the north track. . . . From Valparaiso to Winona Lake the engine which brought the train out of Chicago was working badly, so the engine which was to take the train from Fort Wayne to Crestline was sent to Winona Lake to meet the flyer. . . . Robert Russell of Toronto and Fred Beckwith of New York, passengers, were imprisoned in the vestibule between the diner and the car immediately to the rear, and were unable to escape from their narrow prison. Their cries attracted rescuers who cut away the roof of the car and saved them.

"After the crash," said George Mitchell, of Los Angeles, "there was a panic such as I never supposed could happen. I saw strong men seize a woman whose companion had broken a window and was pushing her through it, pull her back and crawl out themselves. Several men in a panic of fear rushed over me and my family, and as a matter of fact, we were the last to get out of the car. My daughter, aged 14, has a bad cut on her leg, but the rest of us escaped with only bruises and slight cuts. If it had not been that the cars were of steel I think that we should all have been killed."

This train was derailed at Indiana Harbor, 128 miles west of Fort Wayne, one week previously.

Passenger Station Platforms Lighted by Approaching Trains.

That the platforms of small passenger stations could be lighted much better than they usually are, without increasing the cost, if the lights were kept burning only when needed, is obvious to any one; and now the signal department of the Southern Pacific has taken up this idea and carried it out; and at one station the cost of the platform lights was reduced from \$14 a month to \$2.

The scheme is simple. The circuit which provides current for the electric lamps on the station platform is closed by a solenoid, energized by the power line, and controlled by a relay in a line-wire circuit extending from the station each way to the first automatic block signal; and the passage of an approaching train past this block signal, throwing that signal to the stop position, closes this control circuit and thereby energizes the station lights. The block signal, of course, remains in the stop position until the train has passed out of that block section (beyond the station). When the signal goes to the clear position, the control circuit is opened, the solenoid is de-energized and the lights go out. The control circuit has circuit closers at both ends, one to be worked by the signal which is actuated by the northbound trains and the other by southbound. Thus the platform is lighted from just before the approach of a train until a short time after it leaves. By local switches the station agent can energize the lights at any time, or can cut off the power entirely.

This scheme was used first at Burlingame, San Mateo, and Paso Robles, Cal., on the Coast division. It is to be installed at other stations. It was first suggested to the superintendent of the division by employees of the signal department. At Burlingame, where the cost has been reduced, as above stated, there were formerly two arc lights; now the station has two arc lights and five 16-candle power incandescent lamps. If it were desired to keep the platform lighted for a longer time the control circuit might be extended to the second signal from the station.

Master Blacksmiths' Association.

The nineteenth annual meeting of the International Railway Master Blacksmiths' Association opened at the Boody House, Toledo, Ohio, August 15. The first session was given over to addresses by the mayor, by B. A. Worthington, receiver of the Wheeling & Lake Erie, and by the president of the association, J. J. Connors, master blacksmith, Atlanta & West Point, Montgomery, Ala. The secretary-treasurer's report showed the association to be in a flourishing condition, the membership having increased from 283 to 314 since the last convention, and the balance in the treasury having increased from \$557 to \$566, although the expenses during the year have been considerably heavier than usual.

The following officers were elected at this meeting: F. F.

Hoeffle (L. & N.), president; T. J. McSweeney (B. & O.), first vice-president, and A. L. Woodworth (C. H. & D.), secretary and treasurer, with office at Lima, Ohio.

The reports and papers which were presented and discussed included the following: Tools and formers, drop forging, high speed steel, frogs and crossings, flue welding, locomotive frame making and repairs, oxy-acetylene for welding and cutting metals, case hardening, spring making and repairs, piecework and other methods of wage payment.

The following firms had exhibits in the parlors of the hotel:

- Acme Machinery Company, Cleveland, Ohio.—Forgings and working model of Acme forging machine.
- Ajax Manufacturing Company, Cleveland, Ohio.—Large number of forgings made in railway shops on Ajax machines. Represented by J. R. Blakeslee, J. A. Murray, H. D. Heman, A. L. Guilford and Henry Gaul.
- Chambersburg Engineering Company, Chambersburg, Pa.—Catalogs, steam and hydraulic forging tools. Represented by H. L. Nixon.
- Clement Restein Company, Philadelphia, Pa.—Belmont steam hammer packing. Representatives, H. O. Fettinger and Norman B. Miller.
- Colonial Steel Company, Pittsburgh, Pa.—Tool steel catalogs. Represented by W. A. Nungester and A. H. Ackerman.
- Crucible Steel Company of America, Pittsburgh, Pa.—Catalogs, high grade tool steels, including high speed steels, alloy steels and carbon tool steels. Representatives, F. Baskerville, R. L. Williams, F. A. Lawler, Wm. Stevenson and H. W. Stocke.
- Goldschmidt Thermit Company, New York.—Thermit welding apparatus and samples of thermit welds, including pipe and rail welds; steel alloys. Represented by H. D. Kelley and Henry S. Mann.
- Halcomb Steel Company, Syracuse, N. Y.—Samples showing physical characteristics of electric furnace chrome vanadium steel. Represented by Thomas J. Moore.
- Hoskin Manufacturing Company, Detroit, Mich.—Recalescent outfit. Representatives, Wilford V. Young and F. Jay Shults.
- Houghton & Co., E. F., Philadelphia, Pa.—Case hardening compounds. Representatives, J. W. Kelley and E. Niessen.
- National Machinery Company, Tiffin, Ohio.—1½-in. wedge grip bolt header in operation. Weighs 18,000 lbs. and is motor driven. Represented by E. R. Frost, H. E. Lott and Carl L. Ernst.
- Railway Materials Company, Chicago.—Catalogs, Ferguson oil furnaces. Representatives, T. B. Cram, E. C. Folsom, G. E. Hoeffle, J. V. Githens and B. C. Hooper.
- Ryerson & Son, Joseph T., Chicago.—Catalogs, spring repairing machinery. Representatives, Fred Gardner, H. H. Linton and J. G. Kirby.
- United Engineering Foundry Company, Pittsburgh, Pa.—Catalogs of high speed forging press. Represented by J. A. Eden, Jr., and F. V. McMullin.

American Association of General Passenger and Ticket Agents.

The fifty-sixth annual convention of the American Association of General Passenger and Ticket Agents will be held at the St. Paul Hotel, St. Paul, Minn., on September 19. C. M. Burt, Boston, Mass., is secretary.

Railroad Chemists & Engineers of Tests.

The date of the next meeting of the Railroad Chemists & Engineers of Tests has been changed from September 7 to October 5. The meeting will be held at the Hotel Stratford, Chicago. W. A. Derby (C. B. & Q.), Aurora, Ill., is secretary.

International Railway General Foremen's Association.

William Hall has been made secretary of the executive committee of the International Railway General Foremen's Association. All communications for this committee should be addressed to him, care of the Chicago & North Western, Escanaba, Mich.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

- AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.
- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.
- AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—C. M. Burt, Boston, Mass.; next meeting, St. Paul, Minn., Sept. 19, 1911.
- AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York; October 9-13, Atlantic City, N. J.
- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York; November 15, Chicago.

Traffic News.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago; Oct. 17-19, 1911, St. Louis, Mo.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—O. T. Harroun, Bloomington, Ill.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreuccetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLead, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual, Buffalo, N. Y.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio; annual, Aug. 15, Toledo, Ohio.

IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION, OF UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass.; Sept. 12-15, 1911, Atlantic City, N. J.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILWAY CLUB.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

RAILROAD CHEMISTS AND ENGINEERS OF TESTS.—W. A. Derby, C. B. & Q., Aurora Ill.; October 5, Chicago.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY CLUB OF PITTSBURGH.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.; annual, Oct. 10, Colorado Springs, Colo.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; September 12-15, St. Louis, Mo.

ST. LOUIS RAILWAY CLUB.—R. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago; Sept. 12-14, St. Paul, Minn.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; annual, October 20, Atlanta, Ga.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—T. J. Walters, Oliver building, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, August 29-September 1, Chicago.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, First National Bank bldg., Chicago; annual, January 16-18, Chicago.

The Western Classification Committee, whose meeting in Milwaukee last month was adjourned, resumed sessions in Chicago on August 14.

The absorption of the Pacific Express by the Wells Fargo Express Company, which has now been carried out, results in the abolition of about 40 offices of the Pacific company in Texas cities, and towns.

Announcement has been made by the Northern Pacific that hereafter its trains into and out of Winnipeg, Man., will arrive at and depart from the new terminal station at that place.

The Southern Pacific in Mexico has reduced first class passenger fares from 7 cents a kilometer to 5 cents, or about 8 cents a mile. No change has been made in second class fares nor in the rates on the Sonora Railway.

The Pennsylvania Lines west of Pittsburgh will next week run a "Seed and Soil" lecture train for the benefit of the farmers on its lines in Ohio and Indiana, carrying lecturers from the Ohio State Agricultural College.

Second class party fares from Kansas City, Omaha and Council Bluffs to Minneapolis and St. Paul have been withdrawn by the railway companies operating between these points, effective October 1 on the Wabash and September 15 on the other roads.

The Atchison, Topeka & Santa Fe, the Union Pacific, the Missouri Pacific and the Chicago, Rock Island & Pacific have indicated to the Public Utilities Commission of Kansas that they will haul seed wheat free to the farmers in the eleven counties of northwestern Kansas who suffered during the recent drought in that section. It is estimated that four of the counties will need a total of about 125,000 bushels of seed.

Wisconsin now has a law providing that upper berths in sleeping cars, when not engaged or occupied, shall be left up so as not to disturb the person occupying the lower berth. Any corporation violating this law is subject to a fine of \$50 to \$100, and any porter or other person in charge of the car violating the law shall be deemed guilty of a misdemeanor and will be subject to a fine of \$100 or imprisonment not exceeding six months.

The Illinois Traction System, which has opened an office in the McCormick building, Chicago, is soliciting freight from Chicago for points in Illinois on its lines. While the tracks of the system do not enter Chicago, it is said that plans for securing such an entrance are under way. On completion of an extension of this road between Morris, Ill., and Joliet, direct connection will be had with the Chicago & Joliet Electric Railway, which runs between Joliet and Chicago.

Traffic officers of the roads belonging to the Railway Ticket Protective Bureau have met in Chicago to discuss the advisability of continuing the bureau as a means of preventing a renewal of wholesale ticket scalping. Although some of the roads, thinking that the work of the organization has been accomplished, decided to withdraw from it, the general belief is that the expense of maintaining the bureau is a small item compared with the benefits which are derived from its operation, and that it should be continued.

The Iowa Railway Commission has refused to grant the petition of the railways asking for an increase in the minimum carload weights on shipments of cattle, hogs and sheep. After hearing both shippers and railways it was decided by the commission that the ordinary carload of the ordinary farmer in Iowa is such, on account of the size of the farms in that state, that an increase in these minimum weights would work to the disadvantage of many shippers of live stock. As no evidence was presented by shippers against raising the minimum weights on shipments of horses, the increase asked for by the roads will be permitted take effect as to them.

Wholesale merchants of Galveston, Houston, Dallas, Fort Worth, San Antonio, Beaumont, Waco and Sherman, Tex., and

Oklahoma City, Okla., have formed the Seaboard & Gulf Steamship Company, with a capital of \$1,000,000, to run steamships between New York and Baltimore and Galveston. It is charged that previous attempts to compete with the established lines between these points have resulted in the large companies taking over the independent companies or cutting their rates to a point where the latter were forced out of business. As the present company is to be run on a co-operative plan, it is believed that it will be able to compete very successfully with the established lines.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 101, giving a summary of shortages and surpluses by groups from April 13, 1910, to August 2, 1911, says:

"There is a decrease in the surplus of all classes, the total decrease being 20,297 cars, bringing the total surplus down to 130,136, the lowest figure since the report for January 4. The

decrease is principally in coal cars, although box cars shows a reduction of 3,071, and miscellaneous cars 1,862. The total car decrease is heaviest in group 2 (Eastern), although group 3 (Middle), also shows an improvement in the demand for this class of equipment. The box car decrease is general, with the exception of an increase in group 6 (Northwestern), which is probably due to the assembling of empties for grain movement."

The accompanying table gives surpluses and shortages by groups in the last period covered by the report, and the chart shows total bi-weekly figures in 1907 to 1911.

Freight Car Balance and Performance.

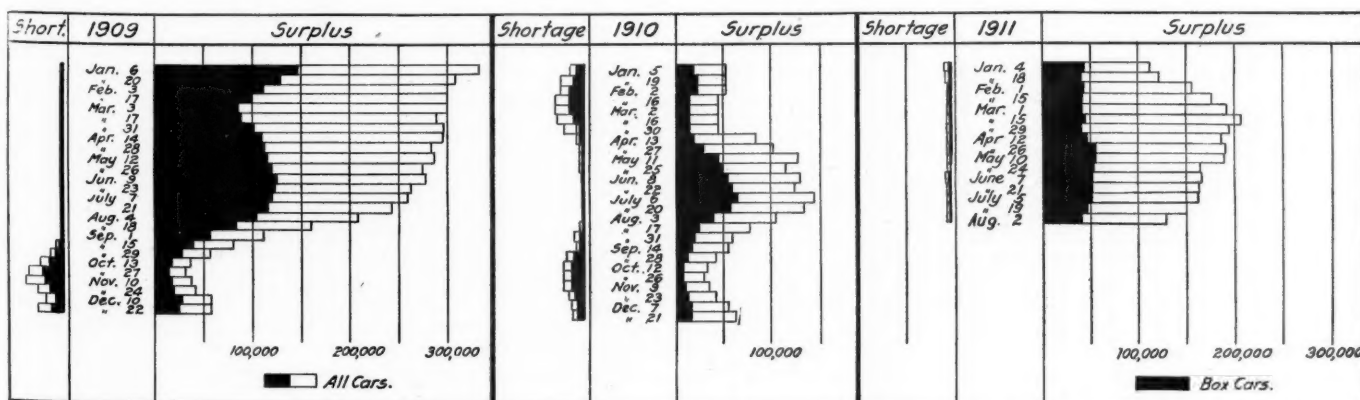
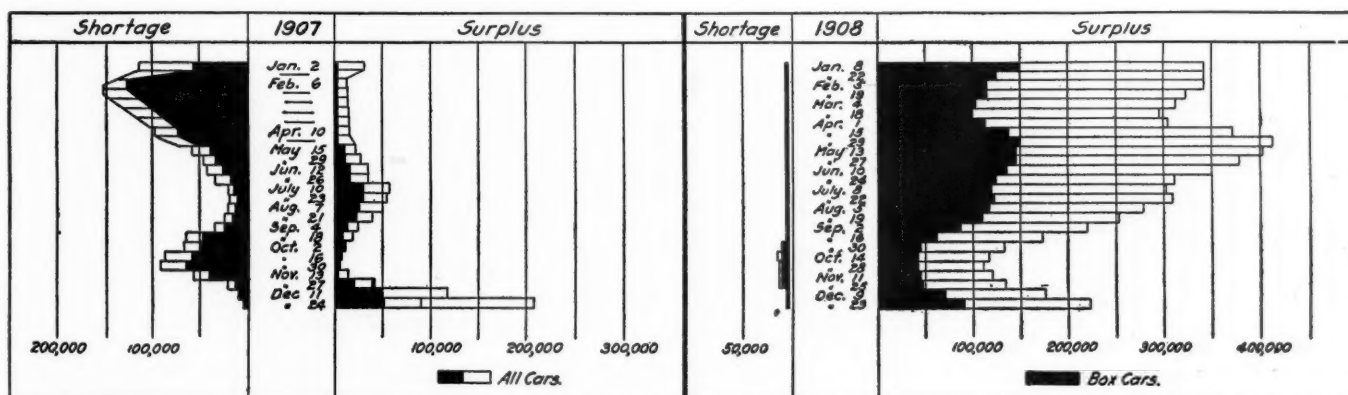
Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 102, covering car balance and performance for April, 1911, says:

"As noted on the chart there was a general drop from the usual 'peak' performance of March, the only exception being in

CAR SURPLUSES AND SHORTAGES.

Date.	No. of roads.	Surpluses					Shortages				
		Box.	Flat. gondola and hopper.	Coal.	Other kinds.	Total.	Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group #1.—August 2, 1911.....	7	1,935	933	1,560	338	4,766	0	68	300	0	368
" 2.—" 2, 1911.....	26	3,472	188	4,788	3,851	12,299	13	1	413	0	427
" 3.—" 2, 1911.....	27	4,920	520	28,303	3,772	37,515	22	100	0	3	125
" 4.—" 2, 1911.....	10	908	136	1,375	1,153	3,572	127	124	0	0	251
" 5.—" 2, 1911.....	20	3,193	443	3,206	1,809	8,651	65	40	192	0	297
" 6.—" 2, 1911.....	26	12,433	1,019	3,013	7,335	23,800	10	6	0	5	21
" 7.—" 2, 1911.....	4	1,414	48	483	794	2,739	0	0	0	0	0
" 8.—" 2, 1911.....	19	6,330	180	2,483	4,515	13,508	0	0	0	0	0
" 9.—" 2, 1911.....	12	2,028	318	501	837	3,684	0	0	0	15	15
" 10.—" 2, 1911.....	19	6,054	820	2,143	9,506	18,523	2	0	0	0	2
" 11.—" 2, 1911.....	5	917	51	27	84	1,079	320	161	0	58	539
Total	175	43,604	4,656	47,882	33,994	130,136	559	500	905	81	2,045

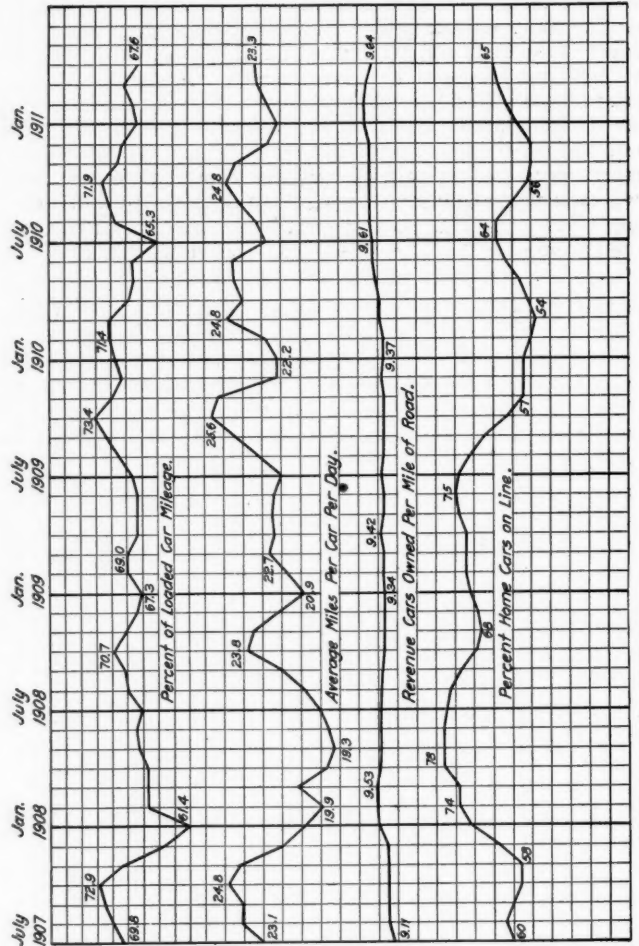
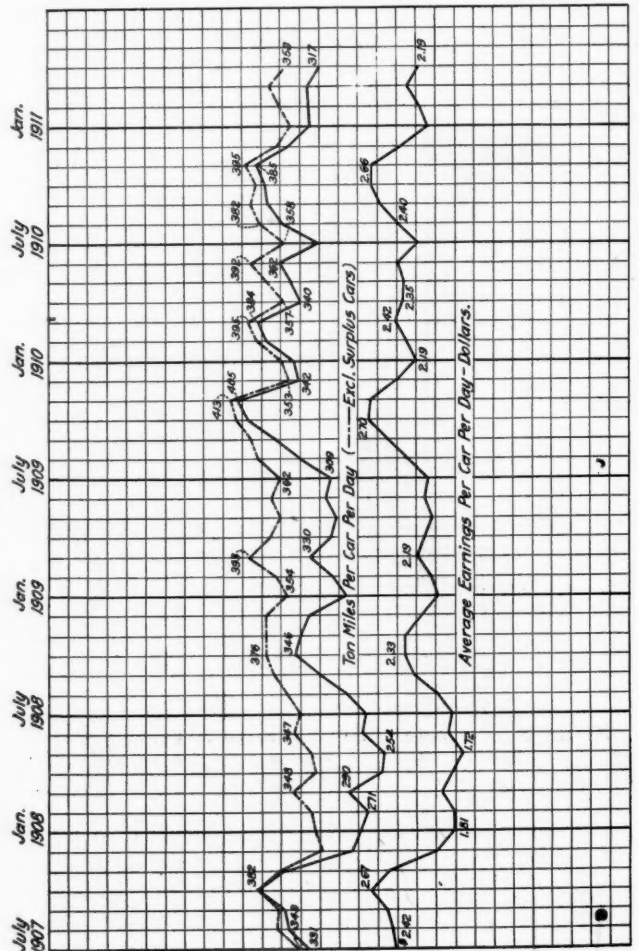
*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1911.

CAR BALANCE AND PERFORMANCE IN APRIL, 1911.

	New England	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. and So. Carolina	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kan., Colo., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Revenue freight cars owned.....	79,376	681,350	221,337	183,553	170,532	388,723	18,591	135,887	19,646	143,348	106,260	2,148,603
Average number of system cars on line.....	44,341	438,139	149,995	119,109	108,495	279,890	7,766	94,231	16,839	63,810	75,522	1,398,137
Railway-owned cars: Average foreign on line.....	36,876	232,106	81,139	66,863	55,336	99,804	12,478	41,014	14,288	50,560	30,428	720,892
Total Railway-owned cars on line.....	81,217	670,245	231,134	185,972	163,831	379,694	20,244	135,245	31,127	114,370	105,950	2,119,029
Excess.....	1,841	.....	9,797	2,419	.....	.....	1,653	.....	11,481	.....	.....	.....
Per cent. of cars on line to total owned:												
Home.....	56	64	68	64	64	72	42	69	86	45	71	65
Foreign.....	46	34	36	37	32	26	67	30	73	35	29	34
All railways.....	102	98	104	101	96	98	109	99	159	80	100	99
Private cars on line.....	2,967	41,079	10,759	4,923	6,079	13,860	1,470	5,556	2,053	12,528	2,691	103,965
Total, all cars on line.....	84,184	711,324	241,893	190,895	169,910	393,554	21,714	140,801	33,180	126,898	108,641	2,222,994
Per cent. of cars in shop.....	5.25	6.23	7.70	6.26	8.11	7.59	5.84	9.05	6.17	5.29	6.97	6.86
No. of freight engines owned.....	1,185	10,030	2,977	3,138	2,602	6,343	505	2,688	577	2,596	2,158	34,799
Average cars on line per freight engine owned..	71	71	81	61	65	62	43	52	58	49	50	64
Total freight-car mileage.....	44,383,528	487,036,316	143,044,110	132,493,259	124,473,110	268,124,120	23,241,599	86,337,090	26,265,877	120,937,021	96,519,218	1,552,855,248
Average miles per car per day.....	17.6	22.8	19.7	23.1	24.4	22.7	35.7	21.4	26.4	31.8	29.6	23.3
Per cent. loaded mileage.....	73.5	65.5	68.5	61.7	66.5	70.3	75.6	68.1	63.5	69.8	72.0	67.6
Ton-miles of freight, including company freight..	487,229,794	6,887,328,355	1,990,663,518	1,835,877,506	1,461,236,935	2,149,922,843	351,367,803	1,138,588,434	296,987,179	1,612,003,533	1,141,362,097	19,352,567,997
Average ton-miles, including company freight:												
Per car-mile.....	11.0	14.9	14.7	13.9	11.8	12.8	15.8	13.2	11.3	13.5	11.8	13.7
Per loaded car-mile.....	14.9	22.9	21.4	22.4	17.8	18.7	22.4	17.6	20.8	19.4	16.4	20.4
Per car per day.....	193	324	298	321	289	301	586	282	298	428	350	317
Gross freight earnings.....	\$5,667,413	\$43,822,285	\$11,266,331	\$10,491,222	\$25,655,705	\$25,655,705	\$2,622,041	\$2,242,488	\$2,417,612	\$14,682,274	\$8,626,390	\$146,140,600
Average daily earnings: Per car owned.....	2.38	2.14	1.75	2.05	2.05	2.20	4.83	2.27	4.10	3.42	2.71	2.27
Per railway car on line.....	2.23	2.18	1.68	2.02	2.13	2.25	4.45	2.28	2.25	4.30	2.71	2.30
All cars on line.....	2.24	2.05	1.60	1.97	2.06	2.17	4.14	2.18	2.43	3.87	2.65	2.19



Car Loading, Earnings and Performance in 1907 to 1911, Inclusive.

the average miles per car per day, which shows an increase from 23.2 to 23.3 (average excluding surplus cars 26.0), this increase being at the expense of the loaded mileage which dropped from 68.6 per cent. to 67.6 per cent. The decreases were not, however, so striking as the April decreases in previous years, although it should be remembered that the March, 1911, performance was below that of 1910.

The ton miles per car per day decreased from 332 to 317, the average excluding surplus cars being 353, as compared with 369 in March. The earnings were decreased from \$2.28 to \$2.19, the average excluding surplus being \$2.44, as against \$2.58 in March. As usual in April, the return movement of cars to their home lines has begun, the cars on home lines increasing from 63 per cent in March to 65 per cent. in April."

The accompanying table gives figures by groups for April, and the charts show totals in 1907 to 1911.

The Commission's Attitude Toward Competition.

Very few even of railway managers deny that it is advisable that there should be a tribunal for the adjustment of differences between the railways and the shippers. The Interstate Commerce Commission is such a tribunal.

It has at times seemed to the railways that the commission instead of being a tribunal in all that the term applies has considered itself as the representative of the shippers in their controversies with the railways. That this is not true is evidenced by the fact that approximately one-half of the complaints made to the commission in three or four years following the passage of the Hepburn Act were decided against the complainants. It has, moreover, rendered decisions that have tended to relieve the railways of burdens that the shippers had forced on them and of which they could not relieve themselves. Such are the decisions that elevation allowances and divisions of through rates with industrial lines and tap lines are unlawful. Certain of its decisions, however, have seemed to consider different railways under different corporate ownership as not entitled to the fullest consideration that separate corporate ownership would seem to imply. Such is the decision compelling the line between Portland and Seattle to participate in the division of a through passenger rate from the Missouri river, while the company owning the through line from the river believed that it should have the through traffic rate, or else its local rate for the shorter haul. Another such decision is that which for the benefit of wholesale merchants at Kansas City and other points on the Missouri river reduced the through rates from the East. If it is the will of the people that separate lines under separate corporate ownership should be utilized as though they were parts of one system it would seem unfair that they should prohibit the amalgamation of such lines under one ownership. That is, if the lines are to be deprived of the advantages of competition they should be allowed the benefits of amalgamation, especially as the commission now has the power to prevent the evils that in earlier times might have ensued from such amalgamation.—*L. E. Johnson*, before the Southern Shoe Wholesalers' Association.

INTERSTATE COMMERCE COMMISSION.

The commission has suspended until December 13 certain tariffs filed by railways west of Chicago, making an advance of 25 per cent. in the freight rates on "feeding cattle."

The commission has issued an order reducing the rates on citrus fruits from Florida to 215 points in Northern states. An order was issued some time ago making reductions to Western cities, and the roads were notified to make these other reductions themselves; but they have not done so, apparently because they could not agree on the division of the rates, and so the commission steps in. The rates are to take effect October 2.

The Commission has announced hearings as follows: By Commissioner Lane on the application of the long and short haul clause over the Shasta route in San Francisco August 30, and in Portland, September 4. At Los Angeles on September 14 on rates on barley, bran and wheat. On September 25 on the pipe line question in Houston, Tex. By Commissioner Prouty in the cases of the Mohair Growers' Association and on rates on wool, hides and pelts from various Western points to Eastern destinations in Chicago September 6; in Albuquerque, N. M., September 12; in Denver September 14; in Salt Lake City September 19; in Portland, Ore., September 26, and in Phoenix, Ariz., October 2.

STATE COMMISSIONS.

The decision of the New York State Public Service Commission, Second district, refusing a certificate of necessity to the Buffalo, Rochester & Eastern is reported on page 318.

The governor of Massachusetts has appointed Frederick J. Macleod chairman of the State Railroad Commission in place of William P. Hall, who has been appointed a judge of the superior court.

The Wisconsin Commission has notified the railways that under the law passed this year, chapter 160, the commission must be notified as early as possible of all intended changes in freight rates; and reasons must be given for making each change.

The Ohio Public Service Commission has ordered the Cincinnati, Hamilton & Dayton to provide better passenger and freight service between Wellston and Ironton. Passenger trains spend so much time loading and unloading freight that passengers complain that the trip between the two cities—50 miles and back, cannot be made in a single day.

The California State Railroad Commission has established through routes and joint rates for the Oakland & Antioch Electric Railway, and the Atchison, Topeka & Santa Fe, and ordered them to be put in effect September 12. The decision states that the electric road may compete with the Southern Pacific in freight traffic between San Francisco, Oakland, Stockton, Concord, Hookston and Walnut Creek.

The Colorado Railway Commission has issued an order dismissing the case brought by George J. Kindel against the Adams, the American, the United States, the Wells-Fargo and the Globe Express companies alleging that they violate the United States postal law by carrying for hire over post routes established by law packets weighing four pounds and less, single books, etc. It was also charged in the complaint that the rates, rules and tariffs which the defendants have on file with the state commission contain and provide for illegal rates and charges. The companies denied the allegations in the complaint. Basing its opinion on a decision of the Interstate Commission in a case where the questions involved were identical, the Colorado commission dismissed the complaint indicating that if the acts complained of were in violation of the United States postal laws it would have no jurisdiction and that it did not believe they were in violation of the laws of Colorado.

The New York State Public Service Commission, Second district, in an opinion by Commissioner Decker, has ordered the installation on or before September 1 of passenger train service on the Mahopac Falls Railroad between Mahopac Falls, one of its termini, and Baldwin Place or such other station on the Putnam or Harlem division as the operating company, The New York Central, may deem appropriate. The service required is not less than one morning train south-bound from Mahopac Falls and one evening train north-bound to Mahopac Falls, each to be run so as to afford reasonable through service to and from New York City, such service to continue for a period of not less than six months. The company is also required to keep accurate account of the train revenues and operating expenses in connection with the passenger service. The road is two miles long and connects with the Putnam division of the Central at Baldwin Place. It has been without passenger service since 1900, during which year it was discontinued without lawful authority from the state. The complaint also involved alleged inadequate freight train service to and from Mahopac Falls, but that part of the complaint is not sustained.

COURT NEWS.

Suits based on the illegal shipment of oil from Olean, N. Y., to points in Vermont, for which the railways and the Standard Oil Company have recently paid heavy fines, are still in the United States court at Buffalo; and on application of the government attorney last week, Judge Hazel held that the Standard Oil Company might be prosecuted for two untried indictments, containing about 200 counts each. The defendant argued that the alleged offense was covered by the fines already paid, but Judge Hazel sustained the government, holding that each shipment was a separate offense; the lump sums paid could not be taken to cover all of the shipments which had been made.

RAILWAY AGE GAZETTE.

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REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JUNE, 1911. (SEE ALSO ISSUES OF AUGUST 4 AND 11.)

REVENUES AND EXPENSES																		
MONTH OF JUNE, 1911. (SEE ALSO ISSUES OF AUGUST 4 AND 11.)																		
Name of road.	Mileage operated at end of period.	Operating revenues				Maintenance of way and structures		Operating expenses				General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or dec.) last year.
		Freight.	Passenger.	Inc. misc.	Total.	Way and structures.	Equipment.	Traffic.	Portation.	Trans.								
Atlanta, Birmingham & Atlantic.....	661	\$142,333	\$55,700	\$211,406	\$28,436	\$36,682	\$17,180	\$87,366	\$8,453	\$178,117	\$33,289	\$1,314	\$10,500	\$22,789	\$3,188	\$289,197	\$3,305	\$1,188
Boston & Maine.....	2,242	2,203,124	1,343,537	3,663,030	679,138	611,928	47,708	1,989,379	99,758	3,427,911	435,119	.....	2,000	289,197	10,334	28,848	10,334	10,334
Butte, Anaconda & Pacific.....	46	72,837	8,859	86,694	12,363	15,287	612	33,938	2,439	56,086	30,848	.....	3,289	66,536	43,236	66,536	43,236	43,236
Carolina, Clinchfield & Ohio of S. C.....	236	136,485	12,085	154,121	12,363	21,994	1,102	6,537	611	27,622	1,961	.....	519	1,442	147	1,442	147	147
Central New England.....	276	215,611	28,531	261,368	60,880	24,261	1,567	78,812	3,357	168,777	92,591	.....	13,169	77,743	4,100	77,743	4,100	4,100
Chesapeake & Ohio.....	1,971	1,971,932	438,884	2,575,684	474,462	426,568	50,073	706,158	61,660	1,718,920	856,764	.....	93,250	778,875	17,859	778,875	17,859	17,859
Chicago & Alton.....	1,025	814,668	360,032	1,287,023	117,583	321,421	38,814	414,298	31,352	576,506	328,955	.....	28,502	299,502	31,732	299,502	31,732	31,732
Chicago & Eastern Illinois.....	905	679,336	163,500	905,461	76,307	109,999	20,155	337,202	182,302	528,136	1,706,026	.....	337,202	279,604	279,604	279,604	279,604	279,604
Chicago, Burlington & Quincy.....	9,074	4,449,962	1,874,968	6,987,389	1,363,071	1,448,731	129,375	2,157,884	182,302	5,281,363	1,706,026	.....	3,531	1,398,740	55,246	1,398,740	55,246	55,246
Chicago, Peoria & St. Louis.....	255	85,914	75,765	168,333	18,724	22,547	792	56,163	3,220	109,024	8,869	.....	4,169	47,000	14,265	47,000	14,265	14,265
Cincinnati & Northern.....	245	73,585	19,480	98,893	27,321	19,553	3,052	36,787	7,317	195,322	22,346	.....	11,295	34,282	100,027	34,282	100,027	100,027
Evansville & Terre Haute.....	309	97,016	55,645	155,561	12,976	55,834	47,067	78,497	8,368	109,613	45,948	.....	5,340	40,608	27,264	40,608	27,264	27,264
Gulf & Ship Island.....	307	109,746	69,559	257,706	25,706	27,010	1,796	42,731	16,714	287,830	295,740	.....	31,919	263,821	65,452	263,821	65,452	65,452
Hocking Valley.....	350	463,292	69,559	583,570	35,708	67,177	9,368	167,714	17,847	287,830	295,740	.....	219,773	1,072,928	218,558	1,072,928	218,558	218,558
Hocking Central.....	4,773	1,325,366	478,290	627,691	945,821	119,206	19,164	287,796	28,082	578,229	73,746	.....	19,844	53,822	43,673	53,822	43,673	43,673
International & Great Northern.....	1,159	418,966	180,615	651,975	123,482	119,206	1,192	43,702	4,280	83,084	30,779	.....	7,666	43,113	10,244	43,113	10,244	10,244
Lehigh & Hudson River.....	96	129,140	3,350	133,863	16,950	16,960	1,192	43,702	4,280	83,084	30,779	.....	3,998	63,179	64,962	63,179	64,962	64,962
Louisville & Nashville.....	4,629	2,904,516	943,067	4,114,496	843,125	752,033	88,559	1,393,170	98,140	3,176,027	938,469	.....	311,289	631,179	293,458	631,179	293,458	293,458
Missouri, Kansas & Texas.....	1,736	868,103	427,421	1,426,276	161,322	233,982	35,297	450,334	47,701	928,636	497,640	.....	449	58,500	293,458	497,640	293,458	293,458
Nashville, Chattanooga & St. Louis.....	1,230	656,639	230,313	951,997	129,439	185,006	36,398	362,753	29,075	742,671	209,326	.....	28,781	180,589	47,737	180,589	47,737	47,737
New York, New Haven & Hartford.....	2,040	2,782,780	2,235,047	5,572,860	685,515	517,249	41,082	2,052,996	156,868	3,453,010	1,369,781	.....	1,728,700	1,409,225	31,778	1,409,225	31,778	31,778
Norfolk & Western.....	6,027	3,258,446	1,448,888	5,052,860	917,308	590,733	113,999	1,611,726	90,394	3,324,160	1,728,700	.....	1,547	6,366	31,778	6,366	31,778	31,778
Northern Pacific.....	240	84,223	7,979	94,420	26,705	33,895	1,077	32,875	4,687	99,239	4,819	.....	5,267	76,576	36,205	76,576	36,205	36,205
Pittsburg, Shawmut & Northern.....	83	122,054	71,826	221,597	29,804	19,674	2,989	70,556	6,476	129,039	92,098	.....	153,814	1,144,639	301,674	1,144,639	301,674	301,674
Richmond, Fredericksburg & Potomac.....	4,732	1,949,140	954,145	3,136,541	283,157	336,067	72,885	1,058,927	86,452	1,838,088	1,298,453	.....	5,700	12,310	14,907	12,310	14,907	14,907
St. Louis & San Francisco.....	9	528,223	296,692	864,312	122,500	135,379	32,395	295,811	18,430	106,315	259,797	.....	cr.	72,000	80,239	72,000	80,239	80,239
St. Louis Merchants Bridge Terminal.....	1,113	1,142,609	386,827	1,714,664	245,092	203,789	51,066	610,863	56,805	1,167,615	547,049	.....	936	474,113	80,239	474,113	80,239	80,239
San Pedro, Los Angeles & Salt Lake.....	3,046	1,424,674	2,094,973	1,281,344	24,281	18,486	2,280	33,067	3,762	71,876	151	.....	5,267	2,720,710	311,523	2,720,710	311,523	311,523
Seaboard Air Line.....	280	34,674	29,343	72,027	24,281	18,486	2,280	33,067	3,762	71,876	151	.....	465,190	26,500	26,101	465,190	26,500	26,101
Southern Ry. in Mississippi.....	6,187	4,151,792	2,675,589	996,646	695,889	237,043	2,059,853	2,059,853	7,831	138,287	38,467	.....	26,500	58,704	31,002	58,704	31,002	31,002
Southern Pacific Co.....	34	317,765	196,754	196,754	48,441	24,894	9,604	124,745	8,134	274,809	72,956	.....	14,252	58,704	19,876	58,704	19,876	19,876
Terminal R. R. Ass'n of St. Louis.....	450	260,951	36,837	317,765	38,370	63,896	1,254	36,543	3,462	70,714	31,169	.....	54,688	122,983	90,664	122,983	90,664	90,664
Toledo, St. Louis & Western.....	35	39,007	101,883	17,615	17,615	15,548	15,548	263,556	24,730	551,778	177,961	.....	.....	.....	.....	.....	.....	.....
Washington Southern.....	1,371	481,492	192,983	729,739	155,386	92,562	15,548	263,556	24,730	551,778	177,961	.....	.....	.....	.....	.....	.....	.....
Yazoo & Mississippi Valley.....	661	\$2,020,778	\$614,558	\$2,810,410	\$355,538	\$444,451	\$183,270	\$1,055,307	\$109,251	\$2,147,817	\$662,593	.....	\$131,146	\$531,447	\$75,322	\$531,447	\$75,322	\$75,322
Atlanta, Birmingham & Atlantic.....	2,242	25,891,481	15,524,431	44,815,084	6,066,121	6,448,435	500,351	21,229,175	1,104,621	35,148,703	9,666,381	.....	2,089,905	7,644,712	2,346,519	7,644,712	2,346,519	2,346,519
Boston & Maine.....	46	910,680	95,977	1,072,037	1,072,037	1,072,037	1,072,037	7,455	483,143	27,719	849,996	222,034	.....	24,614	197,420	105,057	197,420	105,057
Butte, Anaconda & Pacific.....	236	1,503,414	154,475	1,703,294	1,581,238	237,331	69,611	378,647	99,866	943,703	759,591	.....	6,789	697,894	378,375	697,894	378,375	378,375
Carolina, Clinchfield & Ohio of S. C.....	18	86,085	17,028	106,368	17,028	17,028	1,005	11,693	28,029	6,355	52,214	.....	.....	49,495	28,696	49,495	28,696	28,696
Central New England.....	276	2,694,224	349,958	3,218,255	609,655	272,445	20,681	939,430	56,504	1,898,715	1,319,540	.....	162,169	1,155,916	185,757	1,155,916	185,757	185,757
Chesapeake & Ohio.....	284	1,197,738	257,567	1,532,738	342,676	354,034	66,806	852,168	60,418	1,676,798	1,433,359	.....	45,480	985,727	1,494,433	985,727	1,494,433	1,494,433
Chicago & Alton.....	1,957	24,395,288	5,255,365	31,050,672	3,798,896	5,844,794	548,332	9,192,005	733,289	20,117,317	10,933,155	.....	9,445	1,020,373	165,965	1,020,373	165,965	165,965
Chicago, Burlington & Quincy.....	1,025	9,215,721	4,265,988	14,592,519	1,739,917	2,395,998	494,685	5,405,474	410,562	10,446,636	9,445	.....	422,604	3,696,899	556,480	3,696,899	556,480	556,480
Chicago, Peoria & St. Louis.....	965	9,421,508	2,094,973	1,281,344	11,521,561	1,152,561	1,152,561	279,782	4,538,102	396,986	8,344,463	3,936,881						

waukee & St. Paul and served in various clerical capacities in the passenger department for about a year, when he was assigned to the advertising department. He remained in the latter position until he became connected with the Great Northern and was placed in charge of the advertising department, in which office he had much to do with immigration and colonization work. On the establishment last year by Congress of the new Glacier National Park, the southern boundary of which is marked by the right-of-way of the Great Northern, his responsibilities were increased as the opening of the park presented newer and greater advertising possibilities. On August 1 Mr. Noble relinquished these duties to become general passenger agent, with headquarters at St. Paul, Minn.

Engineering and Rolling Stock Officers.

L. L. Ulrey has been appointed foreman of the air brake department of the Chicago & Eastern Illinois, with headquarters at Oaklawn, Ill.

Walter H. Donley has been appointed master mechanic of the Illinois Central, with office at East St. Louis, Ill., succeeding F. G. Colwell, resigned to go with the Delaware, Lackawanna & Western.

H. A. Witzig has been appointed master mechanic of the Missouri Southern, with office at Leeper, Mo., in charge of shops and rolling stock, succeeding to the duties of Thomas Goulding, superintendent of motive power, resigned to go to the Chicago, St. Paul, Minneapolis & Omaha.

A. S. Abbott, master mechanic of the St. Louis & San Francisco, at Sapulpa, Okla., has been appointed mechanical superintendent of the First district, and J. Foster, master mechanic at Kansas City, Mo., has been appointed mechanical superintendent of the Second district, both with offices at Springfield.

Porter Allen, assistant supervisor of Division No. 3, Philadelphia division of the Pennsylvania Railroad, has been appointed supervisor of Division No. 15, Pittsburgh division, with office at Uniontown, Pa., succeeding S. H. Kuhn, transferred, and J. E. Zullinger has been appointed assistant supervisor of Division No. 14, with office at East Greensburg, succeeding H. M. Grimm, transferred.

G. A. Purdy has been appointed general foreman of bridges and buildings of the Missouri, Kansas & Texas of Texas, with headquarters at Denison, Tex., and O. O. Horton, who holds the same title, has been transferred from Denison to Smithville, Tex. These changes are incident to the promotion of J. L. McDonald from general foreman of bridges and buildings at Denison to superintendent of bridges and buildings, with office at Denison, announced in these columns last week.

E. M. Weaver, whose appointment as engineer maintenance of way of the Long Island Railroad, has been announced in these columns, was born in April, 1865, at Danville, Pa., and was educated at the Danville Academy. Mr. Weaver began railway work in 1882 as a telegrapher on the Pennsylvania Railroad and then served in various capacities in the operating department of that road. He was out of railway work for one year, during which time he was in the employ of the Union Switch & Signal Co. He then went to the New York Central & Hudson River, where he remained for nine years, in charge of the signal departments on the Hudson, Harlem and Putnam divisions and at the New York terminal. In July, 1903, he went to the Long Island Railroad as signal engineer, which position he held until his recent appointment as engineer maintenance of way.

OBITUARY.

Charles S. Davidson, formerly and for many years superintendent of the Hartford division of the New York, New Haven & Hartford, died last week at his home in Hartford. Mr. Davidson was born at East Haven, Conn., in 1829, and began railway work in 1851, as a machinist on the Hartford & New Haven, now a part of the New York, New Haven & Hartford, and from April, 1853, to 1860, was a locomotive engineer. He was then for two years extra conductor and engineman, from 1862 to 1872 he was assistant superintendent. He was promoted to superintendent of the Hartford division in 1872, and he retired from that position in January, 1904.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE MISSOURI PACIFIC has ordered 15 Pacific type locomotives from the American Locomotive Company.

THE PENNSYLVANIA, it is said, will build 15 passenger locomotives, 10 freight locomotives and 10 switching locomotives at its shops at Altoona, Pa.

THE ERIE has divided an order for 40 mikado locomotives between the American Locomotive Company and the Baldwin Locomotive Works, and will build 20 locomotives at the company's shops.

THE ST. LOUIS & SAN FRANCISCO has ordered 12 switching locomotives and 8 Pacific type locomotives from the Baldwin Locomotive Works. The Pacific type locomotives will be used on the Chicago & Eastern Illinois.

THE GOVERNMENT RAILWAYS OF JAPAN have ordered 12 Pacific type locomotives from the American Locomotive Company. The dimensions of the cylinders will be 18½ in. x 24 in., the diameter of the driving wheels will be 63 in., and the total weight in working order will be 132,000 lbs.

CAR BUILDING.

THE ST. LOUIS & SAN FRANCISCO is in the market for 250 flat cars.

THE PENNSYLVANIA is making inquiries on 700 fifty-ton box cars and 26 flat cars.

THE HAVANA CENTRAL is said to be in the market for a number of coal cars. This item is not confirmed.

THE DULUTH, WINNIPEG & PACIFIC has ordered 20 stock and 10 refrigerator cars from the Mt. Vernon Car Company.

THE CHICAGO, MEMPHIS & GULF has ordered 50 flat cars, 50 box cars, 1 caboose and 1 coach from the Central Locomotive Works.

THE ERIE has ordered 1,000 all-steel hopper cars, 1,000 all-steel coal cars, 1,000 fifty-ton gondola cars and 1,000 forty-ton steel underframe box cars, and will build 500 flat cars at the company's shops. The Standard Steel Car Company will build the hopper cars and coal cars, the Pressed Steel Car Company will build the gondola cars, and the American Car & Foundry Company will build the box cars.

IRON AND STEEL.

THE BALTIMORE & OHIO has ordered 1,750 tons of rails from the Carnegie Steel Company.

THE OREGON SHORT LINE has ordered 20,400 tons of rails from the Illinois Steel Company.

THE BOSTON & MAINE has ordered 1,700 tons of bridge material from the Phoenix Bridge Company.

THE MOBILE & OHIO has ordered 819 tons of structural material from the American Bridge Company.

THE ST. LOUIS & SAN FRANCISCO has ordered 4,100 tons of 65-lb. rails from the Pennsylvania Steel Company.

THE SOUTHERN has ordered 5,000 tons of open hearth rails from the Cambria Steel Company, and 5,000 tons from the Maryland Steel Company.

GENERAL CONDITIONS IN STEEL.—On July 31 the unfilled tonnage of the United States Steel Corporation was 3,584,085 tons, an increase of 223,027 tons over the previous month and the best showing since July 31, 1910, when there were 3,970,931 tons. The Steel Corporation is now operating at 76 per cent. of its capacity, which indicates a production at the rate of over 14,000,000 tons a year. Steel men believe that the government crop reports are more pessimistic than the facts warrant and that if the present depression in Wall street is not prolonged orders will continue to come in at the same high rate as during the past three weeks.

SIGNALING.

Signaling On the New York, Westchester & Boston.

The contract for the block and interlocking signaling on this road has been awarded to the Union Switch & Signal Company, Swissvale, Pa. The block signaling consists of 32 automatic signals on the six mile section of four tracks from West Farms, New York City, the Southern terminus, northeastward to Mount Vernon, N. Y.; eight automatic signals on the two mile section of double track from Mount Vernon eastward to New Rochelle, and 24 automatic signals on the double track section from Mount Vernon north to White Plains, $8\frac{1}{2}$ miles.

These signals are spaced to permit of approximately a $2\frac{1}{2}$ minute headway at the maximum speed of express trains. In locating the signals consideration was given to the possibility of the future use of automatic stops and overlapping the control of signals. The present signals are so placed that with a minimum amount of rearrangement and the addition of the extra blocks necessary, this same headway can still be maintained should the overlap system be required, and all apparatus is being supplied with the parts necessary to change over to this system.

The block system will be operated by alternating current at 110 volts 60 cycles. There will be six interlocking plants, two of which are passing sidings on the double track between Mount Vernon and White Plains; one for two storage siding connections at New Rochelle; one for crossovers on the four track section between West Farms and Mount Vernon; one for the White Plains terminal, including connection to the future extension and the switches for the platform tracks; and one for the junction at Mount Vernon, where the double track sections to New Rochelle and White Plains diverge from each other.

The interlockings will be power operated, all-electric Union style "F" type, operating on storage battery at 110 volts. The storage battery, motor generator and heating system will be housed in the lower floor of the tower buildings.

The signals in most cases will be suspended from catenary bridges in which the mechanism case, supported by the bridge truss is at the top of the post. The well-known Union style "B" mechanism will be used, operating center-pivoted two-position home and distant blades.

This railway is designed for electric operation in which alternating current at 11,000 volts, 25 cycles is distributed to a trolley wire supported by a catenary structure on bridges. These bridges are used, as has been mentioned, to support the signals. Power for the signal system will be obtained from the 11,000 volt distribution. At Mount Vernon a duplicate set of frequency converters will be provided for this purpose. The 11,000 volts will be stepped down to 440 volts necessary for the converter which will deliver alternating current to a duplicate set of signal mains throughout at 2,200 volts 60 cycles. Motor generator sets connected to the signal mains will be used at each interlocking for charging the storage batteries.

An underground conduit system is being laid down throughout the entire territory, for the telephone cables, telephones being the only means of communication that will be used. A separate duct is being provided in the conduit system for the signal cables. The 2,200 volt signal mains will be carried on cross arms on the catenary bridge legs.

All the latest appliances known to the art for safely and expeditiously handling traffic will be used in the signaling of this road and the construction work will be of the most permanent kind and in keeping with the work of the other departments. Some of the special features are:

The absence of A. C. wires common to more than one source of energy. The control of the circuit on both positive and negative wires for A. C. signals. The division of D. C. energy at the more important interlockings. Two separate and distinct indications of the approach of a train into the first two blocks in rear of the home signal. Approach and route locking time and emergency releases.

Lever light indicators will be used on the interlocking machines and all other indications will be given by lights on the track diagram. No indicators of the semaphore type will be used.

Fiber conduit will be used, throughout, instead of wood trunking and loricated pipe will be used for the conduit risers on the bridge legs. The signal and telephone work will be installed according to plans and specifications prepared by the signal department of the road.

Supply Trade News.

Arthur T. Herr has been made western representative of the Inter-Ocean Steel Company, Chicago, with office at the First National Bank building, Denver, Colo.

The Isthmian Canal Commission will receive bids until August 28 on miscellaneous supplies, including plate girders, manganese steel castings, locomotive and car springs, untreated ties, etc. Circular No. 642.

F. E. Guy has been made traffic manager of the Cement Products Exhibition Company, Chicago, with office in the Frick building, Pittsburgh, Pa. Mr. Guy will assist exhibitors in shipping exhibits to Chicago by the best routes and at the most favorable rates.

The H. W. Johns-Manville Company, New York, recently bought the sole American rights to the English J.-M. Sea ring packing. These J.-M. Sea rings are moulded of a laminated material (asbestos, flax or duck), in the form of a wedge, with its thin end turned inwards. There is a hollow space in every ring, between the lip and the heel of the ring, into which the steam follows, so that the steam itself, not the gland pressure, makes the packing pressure tight.

The gross sales of the Western Electric Company, Chicago, for the month of July, show a falling off of 3 per cent., as compared with July, 1910, but the first seven months of the current fiscal year show an increase of 4 per cent. over the corresponding period of last year. The company is earning at the rate of \$66,000,000 a year, which is close behind the high record of \$69,000,000 which it earned in 1906. In the East, the business during July was good; the falling off occurred in the central and western districts. The cable manufacturing department shows the chief decrease. The electrical supplies branch shows a small gain, and the business in the telephone apparatus department is good. Abroad, the company's business is satisfactory and shows a larger rate of increase than in this country. While the number of customers has increased, the value of the average order during the past year has fallen from \$72 to \$70. The company is now employing 26,000 persons, as compared with 29,000 in 1906, which is the largest number ever on the company's books at any one time. The Western Electric Company will soon open a branch office at Richmond, Va., which will be in charge of H. W. Hall, heretofore manager of the Denver, Colo., office. This will make the twenty-fifth distributing office of the company.

TRADE PUBLICATIONS.

HYDRAULIC PUMPS.—The Watson Stillman Company, New York, has issued catalog No. 81, superseding catalog No. 71, of its hydraulic pumps and accessories. One of the features of the design of these pumps is that all valves are placed above the cistern top where they may be easily examined. It is claimed that these pumps do not trap air, a great advantage in hydraulic work. The many types and styles of pumps are illustrated and described and prices are included.

STORAGE BATTERIES.—The Gould Storage Battery Company, New York, has devoted bulletin No. 12 to the storage battery installation in the Detroit river tunnel plant. In this installation a Gould storage battery and its regulating apparatus supplies the means whereby the Detroit Edison Company is enabled to economically pull the load of the Michigan Central trains through the tunnel. The bulletin is illustrated and gives a good account of the success with which this system has met.

ROOFING.—The General Roofing Manufacturing Co., East St. Louis, Ill., has reprinted a report of the Northwestern Lumbermen's Association, Minneapolis, Minn., on the manufacture of various styles of roofing. This report was written by a committee after a thorough investigation of many of the leading roof manufacturing plants in this country. Its purpose is to give the consumer and the retailer a more thorough knowledge of the materials used so that they cannot be imposed upon by fraudulent claims.

Railway Construction.

New Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE.—According to press reports, this company will spend a large sum of money for improvements at Sibley, Mo., where the road crosses the Missouri river. A new bridge is to be built on the old piers. The other improvements to be made include grade reduction work and putting in four miles of second track.

BALTIMORE & OHIO.—An officer writes that double-tracking work is now being carried out by Lorimer & Galliger, Chicago, on the Chicago division, between Hamler, Ohio, and Holgate. A contract for the work was awarded some time ago.

BOSTON ELEVATED.—An officer writes that this company is planning to build an elevated extension from the Sullivan square terminal at Charleston, Mass., over a private right-of-way, through Everett to Malden, three miles. Part of the right-of-way has been secured.

BUFFALO, ROCHESTER & EASTERN.—The New York Public Service Commission, Second district, has again refused to issue a certificate of necessity to this company. The company was organized in 1907 to build from Buffalo, N. Y., east to Rochester, thence to Troy, about 300 miles. The report of the commission is noticed on page 318.

CALIFORNIA ROADS.—Surveys have been made for a line, it is said, from Cottonwood, Shasta county, Cal., via Millville to Whitmore. Clinton Walker is said to be interested.

CANADIAN PACIFIC.—Engineers are now at work, it is said, locating new yards on Island No. 1 at Fort William, Ont., and grading work will be started soon for the six miles of track to be laid there. Connection is to be made with the new yards via the McKellar river bridge and the new Kaministiquia river bridge.

CHICAGO, MILWAUKEE & PUGET SOUND.—According to press reports, a contract has been given to D. J. Burke, Lewistown, Mont., for completing the grade on 18 miles of the branch between Lewistown and Hilger.

COLUSA & HAMILTON.—See Southern Pacific.

DENVER, LARAMIE & NORTHWESTERN.—An officer writes that contracts are to be let at once for building a 43-mile extension. The line is now in operation from Denver, Colo., north to Greeley, 56 miles, and the extension will be continued northwest via Severance, Wellington and Laramie, Wyo., to a point in central Wyoming, and ultimately to Seattle, Wash. The line is being built to carry agricultural products and livestock on the first 150 miles, and coal beyond that point. (September 30, p. 599.)

DENVER, NORTHWESTERN & PACIFIC.—An officer writes regarding the reports that a line is to be built from Orested, Colo., on the Denver, Northwestern & Pacific, southwest to Dotsero, on the Denver & Rio Grande, 42 miles, that this is one of the company's proposed lines, but nothing definite has yet been decided.

DUNBAR & WAUSAUKEE.—Incorporated in Wisconsin with \$150,000 capital, to build from Wausaukee, Wis., to Girard Junction, 14 miles, also to build an extension to Dunbar, 12 miles, in Marinette county. J. W. Wells, Menominee, Mich.; C. B. Culbertson, Detroit, and J. A. Culbertson, Kenilworth, Ill., are interested.

EAST BOSTON MARGINAL FREIGHT.—Incorporated in Massachusetts with \$200,000 capital, to build from Condor and Border streets, in East Boston, Mass., to a connection with the Boston & Albany, near Webster street. A. E. Cox, J. Campbell, W. F. Brown, E. R. Anderson and G. A. Sweetser are incorporators.

GILMORE & PITTSBURGH.—An officer is quoted as saying that the company will build an extension northeast to Dillon, Mont., and put up a new station at that place. Trackage rights have been secured over the Oregon Short Line for part of the way, and there will be about six miles of new track to be constructed. This work is to be carried out at once. The company has filed plans in Montana for an extension from Dillon, northeast to

Whitehall, thence west to Butte, this route may be changed and the line built via Parrot instead of via Whitehall. The company does not intend to build to Butte in the near future, as no definite time has been fixed for such an extension.

GRAFTON, FAIRMONT & CLARKSBURG (Electric).—An officer writes that contracts are to be let this fall, to build an electric line from Grafton, W. Va., west via Boothsville and Bridgeport to Clarksburg, with a connecting line from Boothsville north to Fairmont, in all, about 30 miles. C. F. Sutherland, president, Morgantown. (May 19, p. 1187.)

GRAND TRUNK.—A charter has been granted to the Southern New England in Massachusetts. The company was organized to build the Grand Trunk extension from Palmer, Mass., southeast to Providence, R. I. (July 7, p. 64.)

GREAT NORTHERN.—An officer writes that track laying is now under way on the extension from Stanley, N. D., to Powers Lake, and it is expected to have the work finished this fall. According to press reports, Guthrie & Co., St. Paul, Minn., are the contractors. (December 2, p. 1096.)

HALITE & NORTHERN.—The New York Public Service Commission, Second district, has granted a certificate of public convenience and necessity to this company. The plans call for building from Halite, in Livingston county, N. Y., on the Pennsylvania Railroad, to a connection with the Genesee & Wyoming near Retsof station, 3.5 miles. W. A. Hazard, E. W. Brown and A. Bigelow, New York, are incorporators.

HARRISBURG & SOUTHERN ILLINOIS TRACTION.—An officer writes that the prospects of building this line are good. The projected route is from El Dorado, Ill., southwest via Wasson, Harrisburg and Carriers Mills to Stonefort, about 25 miles. This right-of-way may be changed and the line will probably be extended to have a total length of about 100 miles. J. E. Ehlers, chief engineer, Evansville, Ind.

HUDSON BAY RAILWAY.—According to press reports, a contract has been given to J. D. McArthur, Winnipeg, Man., to build the first section from the northern terminus of the Canadian Northern branch at Le Pas, Keewatin, northeast to Thicket Portage, in the wilderness, 185 miles. The work is to be started at once and will cost about \$3,000,000. The line is to be built to Fort Churchill or Port Nelson, on Hudson bay. (June 2, p. 1296.)

ILLINOIS TRACTION.—According to press reports the extension from Morris, Ill., northeast to Joliet, is to be opened for traffic in September. Connection is to be made at Joliet with the Chicago & Joliet Electric.

IOWA CENTRAL.—See Minneapolis & St. Louis.

LEXINGTON & EASTERN.—See Louisville & Nashville.

LOUISVILLE & NASHVILLE.—An officer of the Lexington & Eastern writes that work is now under way by Winston & Co., Richmond, Va., from a point near the mouth of Peters fork of the Kentucky river, up Boone fork and Wright fork, to the mines of the Consolidated Coal Company, about 6 miles. (May 19, p. 1187.)

MANATAWNEY RAILROAD.—Incorporated in Pennsylvania with \$100,000 capital, to build from Douglassville, Berks county, Pa., north to Spangville, 10 miles. M. J. Person, president, Bethlehem.

MINNEAPOLIS & ST. LOUIS.—Announcement is made that this company will build an extension either from Leola, S. D., or about 250 miles from Watertown, a little further east, to the Canadian border, where connection is to be made with the Canadian Northern or the Grand Trunk Pacific. The company may also build another line from St. Paul, Minn., north to a connection with a Canadian road at Winnipeg, Man. The Iowa Central is planning important extension work, to include a line from Centerville, near the southern border of Iowa, to St. Louis, Mo., about 182 miles.

MISSOURI, ARKANSAS & GULF.—An officer writes that a grading contract has been let to P. A. Herrington, Houston, Mo., and work is now under way from Rolla, south via Lacoma, Anutt, Lenox, Licking, Raymondville or Houston and Willow Springs, to Bakersfield, about 110 miles. There will be three

important trestles, each 125 ft. long. The line is being built to carry farm products, lumber, mining products and live stock. Gilbert Lay, president, St. Clair, and W. B. Payne, engineer, Rolla. (July 21, p. 158.)

MOBILE-WEST SHORE TRACTION.—An officer writes that this company has asked for incorporation to build from Mobile, Ala., south to Alabama Port, on the western shore of Mobile bay, about 25 miles. H. Austill, president; J. N. McAleer, vice-president; E. E. Posey, secretary and treasurer, Mobile. W. B. Delchamps, J. R. Peavy, C. V. Hollinger and M. J. McDermott, and the above officers are directors.

OAKLAND & ANTIOCH (Electric).—A contract has been given by this company for piercing a one-mile tunnel beneath the hills between Contra Costa and Alameda counties, Cal., on the line between Oakland and Walnut Creek. (August 4, p. 269.)

OKLAHOMA-SHAWNEE (Electric).—Incorporated in Oklahoma with \$3,000,000 capital, to build from Oklahoma City, Okla., southeast to Shawnee, about 40 miles, with a branch north to Chaydler, 30 miles. The incorporators include: L. E. Patterson, president of the Oklahoma City Traction Company; H. A. Kroeger, C. Combs, M. E. Springer, A. R. Bettis and A. Cook, all of Oklahoma City.

PENNSYLVANIA LINES WEST.—An officer writes that this company has given contracts to the Brownell Improvement Co., Chicago, and to P. T. Clifford & Son, Valparaiso, Ind., for grade separation work in Cleveland, Ohio, from Central to Hamilton avenues.

PORTLAND & WEST COAST RAILROAD & NAVIGATION COMPANY.—Incorporated in Oregon with \$1,000,000 capital and headquarters at Portland, Ore. The plans call for a line from McMinnville, southwest via Sheridan and Willamina, along the course of the Yamhill and Little Nestucca rivers, thence north to Bay City, Tillamook county, about 80 miles. The incorporators include: W. F. Prier, C. F. Hendrickson and J. H. Upton.

SEATTLE-TACOMA SHORT LINE (Electric).—A contract has been given to the Homer-Crosby Construction Company, Seattle, Wash., for building a line from Seattle, south, via Youngstown and Des Moines to Tacoma, about 35 miles. E. C. Million is interested in the project.

SOUTHERN NEW ENGLAND.—See Grand Trunk.

SOUTHERN PACIFIC.—An officer writes that the Colusa & Hamilton, which was recently incorporated in California, will build from Harrington, Cal., on the Southern Pacific, northeast via College City to Grimes, thence northwest via Sycamore to Colusa, thence north along the west side of the Sacramento river to Hamilton, about 60 miles. E. E. Calvin, president, and William Hood, chief engineer, San Francisco. (July 28, p. 198.)

According to press reports, the Willamette Pacific, recently incorporated in Oregon with \$1,000,000 capital, is to be built by the Southern Pacific interests. The projected route is from Eugene, Ore., west along the Siuslaw river to the Pacific coast, thence south to Marshfield, about 125 miles. It is expected that the work will be finished in two years at a cost of about \$8,000,000. At Marshfield connection is to be made with the Coos Bay, Roseburg & Eastern, now operating a 28-mile line from Marshfield to Myrtle Point, which is owned by the Southern Pacific. It is understood that the construction of the new line means the abandonment by the Southern Pacific of the project to build from Drain, about 38 miles south of Eugene, west to Coos bay, on which some work has already been carried out. The officers of the new company are G. X. Wendling, president; S. O. Johnson, vice-president, both of San Francisco, Cal.; R. M. Cross, vice-president; S. R. Brodie, secretary, both of Portland, Ore.; C. H. Barrell, secretary, Los Angeles, Cal., and C. R. Breck, chief engineer, Eugene, Ore. (See Willamette Pacific, June 30, p. 1714.)

An officer writes that a contract has been given to the Utah Construction Company, Ogden, Utah, to build a branch from Tulasco, Nev., northeasterly to Metropolis, eight miles. Maximum grades will be 1 per cent., and maximum curvature 10 deg. The principal prospective business is in agricultural products. (July 28, p. 199.)

SOUTHERN RAILWAY.—This company has just completed revision and double-tracking work on the line connecting the Chat-

tanooga, Tenn., passenger terminals and freight yards with Ooltewah Junction, where the tracks of the Atlanta and Knoxville divisions meet. This line is 13.75 miles long and is now open for freight and passenger service.

VALLEJO & NORTHERN (Electric).—According to press reports, this company has made financial arrangements for building a section of 17 miles between Vallejo, Cal., and Woodland. (May 12, p. 1133.)

WICHITA FALLS ROUTE.—An officer writes that a contract has been let to the Texas & Oklahoma Construction Co., Wichita Falls, Tex., for work on the Wichita Falls & Northwestern, from Hammon, Okla., north via Moorwood, Leedy, Trail, Camargo, Vici, Detroit, Woodward, Fort Supply and thence into Beaver county. Track has been laid on five miles of the main line and in the material yard. Some of the work will be rough. Maximum grades will be 0.7' of 1 per cent. The line is being built to carry alfalfa, cotton, corn, wheat and other farm products. (Aug. 11, p. 305.)

WICHITA FALLS & NORTHWESTERN.—See Wichita Falls Route.

WILLAMETTE PACIFIC.—See Southern Pacific.

WISCONSIN & NORTHERN.—This company has petitioned the railway commission of Wisconsin for a certificate of convenience and necessity to build an extension from Shawano, Wis., via Appleton to Menasha (March 31, p. 814.)

RAILWAY STRUCTURES.

BIGELOW, KAN.—The Missouri Pacific plans the construction of new passenger stations at Bigelow and Greenleaf, in the near future.

BINGHAMTON, N. Y.—An officer of the Delaware & Hudson writes that a contract has been given to A. E. Badgeley, Binghamton, for putting up a roundhouse, and work is now under way. Contracts for all material and equipment for this roundhouse have also been let.

CENTRALIA, ILL.—The Illinois Central has begun work on a new classification yard, which will include the following: Southbound, receiving yard, 8 tracks; classification yard, 16 tracks; departure yard, 20 tracks; northbound, receiving yard, 17 tracks; classification yard, 32 tracks; departure yard, 16 tracks; all tracks having a capacity of 80 cars. The group of shop buildings will include an office and store building, 40 ft. x 60 ft.; car repair shed, 88 ft. x 800 ft.; blacksmith shop and locker building, 25 ft. x 210 ft.; storehouse and office building, 25 ft. x 310 ft.; wood mill, 50 ft. x 120 ft.; powerhouse, 85 ft. x 160 ft.; machine shop and boiler room, 160 ft. x 170 ft.; roundhouse office, including lockers and lavatories, 30 ft. x 130 ft.; oil, store and office building, 30 ft. x 140 ft.; three 40 ft. cinder pits; a coaling and sand plant; 42 ft. track scale; 50 stall engine-house; 85 ft. turntable; 3 penstocks and 2 water tanks and a number of small accessory buildings. The shop group will be served by 9 tracks, with a total capacity of 520 cars, and the roundhouse group by 12 tracks, with a capacity of 532 cars.

DES MOINES, IOWA.—The Des Moines City Railway is said to have awarded the contract for building a one-story brick addition to its power plant.

DILLON, MONT.—See Gilmore & Pittsburgh under Railway Construction.

DUMBARTON, CAL.—The Southern Pacific will build a new station at Dumbarton, at a cost of \$20,000.

GRAFTON, W. VA.—The Grafton Traction Company (Electric) has awarded the contract for building a bridge 574 ft. long over the Tygarts Valley river, to cost about \$30,000.

GRANGER, WASH.—The Oregon-Washington Railroad & Navigation Co., has been granted a permit to put up a new station at Granger.

GREENLEAF, KAN.—See Bigelow, Kan.

JOPLIN, MO.—The St. Louis & San Francisco has let the contract for building an eight-story passenger station and office

building, which together with other improvements at this place will cost about \$1,000,000. The company will occupy the main floor and basement of the building.

LOS ANGELES, CAL.—The Los Angeles Railway (electric) has given a contract to Arthur S. Bent, Los Angeles, it is said, to put up new car shops in Los Angeles.

LOUISVILLE, KY.—The Louisville Railway (electric) has bought land for the erection of a repair shop and a plant for building street cars. Work on the building will be commenced in the near future.

MONCTON, N. B.—Contracts are said to be let to C. A. Murray and John A. Lea, Moncton, for putting up stations and other buildings between Moncton and Beaver Brook, on the Grand Trunk Pacific. The value of the contracts is about \$150,000.

M. & K. JUNCTION, W. VA.—The Baltimore & Ohio is building a helper station, to cost \$100,000, at M. & K. Junction, and upon completion of the work the present station at Rowlesburg will be closed.

NASHVILLE, TENN.—An officer of the Louisville & Nashville writes that a contract has been given to the Foye-Proctor Company, Nashville, to build reinforced concrete retaining walls and underpasses under the Nashville-Louisville line, from Eighth to Fourth avenues in Nashville. The value of the contract is about \$50,000.

NORTH BERWICK JUNCTION, ME.—The Boston & Maine will build an 85-ft. turntable at North Berwick.

PAJARO, CAL.—The Southern Pacific will establish a new terminal about a half-mile from Pajaro, and will put up a new station, also a round house. The estimated cost of the improvements is \$50,000.

PORTERVILLE, CAL.—The Southern Pacific will build a new station it is said, at Porterville.

PORT ARTHUR, ONT.—The Canadian Pacific will put up a dock at Port Arthur, it is said, to cost \$230,000.

SACRAMENTO, CAL.—Announcement has been made that the Southern Pacific will put up a combined passenger and freight station on I street, in Sacramento.

ST. CLAIR, PA.—The Philadelphia & Reading will build a new roundhouse.

SIBLEY, MO.—The Atchison, Topeka & Santa Fe (see *Railway Age Gazette* of July 21, under Iron and Steel) has awarded the contract to the American Bridge Co. for the material for a bridge over the Missouri river at Sibley. The bridge will be built on the present location and will be of single-track width, but with gauntlet tracks. It will require 9,910 tons of structural steel. The grade on the east approach will be reduced from 0.8 to 0.5 per cent.

TOLEDO, OHIO.—The Hocking Valley will build a new concrete dock this fall on the Toledo water front, to cost about \$300,000. Application has been made to the War department to establish the dock line. Plans for the structure have already been completed.

TORONTO, ONT.—The Canadian Pacific has been given a permit to build the new office building on the corner of King and Yonge streets, Toronto.

TRURO, N. S.—Bids are wanted by L. K. Jones, secretary, Department of Railways and Canals, Ottawa, Ont., up to noon, August 25, for building a stone passenger station for the Intercolonial Railway at Truro, N. S.

WEST ALLIS, WIS.—The railway commission of Wisconsin has ordered the Chicago & North Western to abolish the present grade crossing at National avenue in West Allis, and build a new highway and a new subway within six months from August 8, 1911.

The secretary of public works of the state of Parana, Brazil, has signed a contract with a representative of the Brazilian Railway Construction Company, for the building within the next six years of a railway between Rio Pardo and Curitiba, passing by Bocayuva and Campina Grande, with branches to the ports of Antonina and Paranagua. This line will permit of the journey from Curitiba to the Port of Santos being made in about 12 hours.

Railway Financial News.

ATCHISON, TOPEKA & SANTA FE.—At the annual meeting October 26 the stockholders will be asked to authorize an issue of \$100,289,000 convertible bonds. President Ripley says that the object in asking so large an issue is to prepare for requirements a long time ahead. It is not expected that any will be sold for at least six months. The company now has \$289,000 common stock in its treasury, so the amount to be issued to prepare for all of the proposed bond issue will be \$100,000,000. The stockholders will be asked also to secure the release of \$10,800,000 of the preferred stock deposited by the reorganization committee in 1896 for various purposes. In addition they will be asked to approve the purchase of the line from the Needles, Cal., to Mojave, now operated under lease from the Southern Pacific.

CHICAGO, TERRE HAUTE & SOUTHEASTERN.—A dividend of 1 per cent., payable September 1, 1911, has been declared on the \$6,500,000 income bonds. This is the second payment of interest on these bonds.

DETROIT, TOLEDO & IRONTON.—This property will be sold at auction in Detroit on October 5 in pursuance of the foreclosure decree in favor of the New York Trust Company.

IOWA CENTRAL.—See Minneapolis & St. Louis.

EVANSVILLE & TERRE HAUTE.—A cash dividend of 5 per cent. has been declared on all the outstanding stock, both common and preferred. This is the same rate of dividend which was paid on both classes of stock in 1910, and the *Commercial & Financial Chronicle* says it is understood that the declaration represents an adjustment of dividends in connection with the merging of the Evansville & Terre Haute with the Chicago & Eastern Illinois.

MINNEAPOLIS & ST. LOUIS.—Newman Erb has been elected a director of the Minneapolis & St. Louis and of the Iowa Central. It is announced that Mr. Erb has acquired a large stock interest in these roads and is joining Edwin Hawley in the immediate development of these properties. See *Railway Construction*.

MISSOURI, OKLAHOMA & GULF.—See Oklahoma City Terminal Railway.

NATIONAL RAILWAYS OF MEXICO.—J. N. Gilbrath, head of the Mexican branch of the Waters-Pierce Oil Company, and formerly general manager of the Mexican Central, has been elected a director of the National Railways of Mexico, succeeding M. G. Ribon, resigned.

OREGON-WASHINGTON RAILROAD & NAVIGATION COMPANY.—Henry C. Frick has resigned as a director and member of the executive committee. Frank A. Vanderlip, president of the National City Bank, New York, and a director of the Union Pacific, has been elected a director and member of the executive committee of the O.-W., and of the Oregon Short Line, succeeding Mr. Frick.

OKLAHOMA CITY TERMINAL RAILWAY.—This company has been organized, with \$75,000 capital stock, to take over the bonus raised by the Chamber of Commerce of Oklahoma City, for the building of terminal facilities for the Missouri, Oklahoma & Gulf.

ST. LOUIS & SAN FRANCISCO.—This company has sold to Speyer & Co. about \$3,000,000 equipment trust notes covering about \$3,300,000 worth of cars and locomotives. The entire amount of the issue has been sold privately by Speyer & Co.

ST. PAUL & DES MOINES.—This road, which was sold to the Chicago, Rock Island & Pacific two months ago, is now known as the St. Paul & Kansas City Short Line.

UNION PACIFIC.—Announcement has just been made that Henry C. Frick resigned from the board of directors about two months ago. It is said that the resignation is caused solely by Mr. Frick's desire to lessen his business duties.